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AMERICAN DENTAL ASSOCIATION

JUNE 1, 1947 • VOLUME 34 • NUMBER 11

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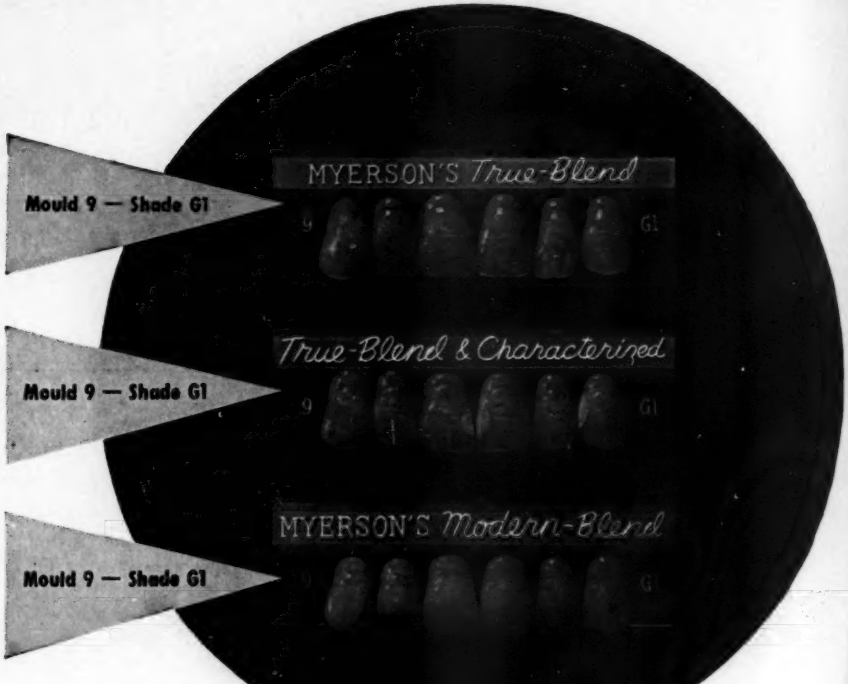

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THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JUNE 1, 1947 • VOLUME 34 • NUMBER 11

A CLOSED MOUTH TECHNIC FOR IMPRESSIONS OF THE LOWER JAW

James J. MacMillan, D.D.S., Carbondale, Pa.

Two simple voluntary movements in the mouth which bring a number of muscles into involuntary action can be utilized to great advantage in muscle trimming the lingual borders of impressions of the lower jaw. If the teeth are placed in centric occlusion and the tongue is pressed against the roof of the mouth, the opposing teeth press against each other with noticeable force and the tongue exerts a pronounced pressure on all regions which it touches. The pressure exerted by the tongue at its base against the alveolar ridge in its entirety is of great importance in taking impressions.

Tongue action is recognized as an important factor in muscle trimming the lingual borders of impressions of the lower jaw. In most technics this muscle trimming has been attempted by a series of protrusive movements of the tongue with the mouth open. It is here submitted that protrusive movements of the tongue are weak and futile as compared with tongue force with the teeth in occlusion and tongue pressure exerted against the roof of the mouth.

The following simple tests will show the difference between tongue force in a closed mouth position and tongue force in protrusive movements.

A ball of wax which becomes workable at mouth temperature is placed in the floor of the mouth posteriorly between the base of the tongue and the alveolar ridge. After the wax becomes workable, the teeth are placed in centric occlusion and the tongue is pressed against the roof of the mouth. The wax travels along the base of the alveolar ridge and the base of the tongue. Removal of the wax and examination of it will show that the wax has changed in shape and has become elongated considerably, although it is still rounded. A marked contrast in the shaping of the wax can be shown by reshaping the wax to a ball shape, placing it in the same region as previously and exerting against it all the forces of protrusive movements of the tongue. Any changes that occur in the wax when all possible protrusive movements of the tongue are applied will be slight, and in most mouths no change will occur.

This article will give in detail a method for obtaining registration of tongue force in a closed mouth technic. Such registrations are taken while the

Fig. 1.—Tray containing reinforcing wire

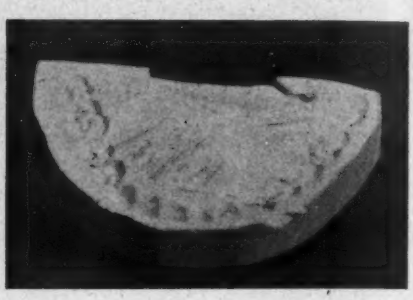

Fig. 3.—Plaster index

patient is using no other force than that used in a normal closing of the jaws to centric occlusion.

Procedure

The upper denture is finished before the impression of the lower jaw is taken. Full impressions of the lower jaw may be taken against the patient's natural upper teeth if the teeth are in a position to exert uniform pressure on the lower base region.

In the case of full dentures the teeth are articulated, and tests for appearance, free way space, vertical dimension, occlusal plane and lip fullness are made as usual. It must be established thoroughly at this stage that the patient can open his mouth wide and then unhesitatingly close his jaws to centric occlusion.

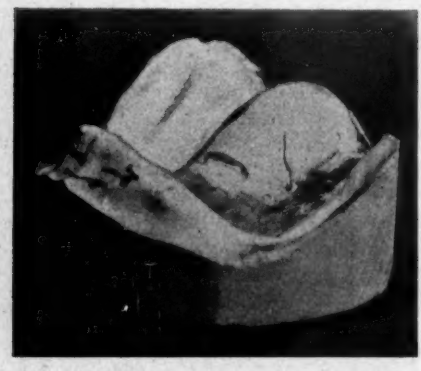

Fig. 2.—Model from which shellac tray was made

The impression of the lower jaw is taken in a shellac tray which is reinforced from one side to the other in the second bicuspid and first molar region by a stiff wire, such as a section of a coat hanger (Fig. 1). The tray should be of sturdy construction so that the heating of low fusing modeling compound with a hand torch in any region will not distort it. The tray is made from a plaster cast (Fig. 2), which is made from a snap impression. Care should be taken that the impression is accurate, as distortion in it may cause the tray to rock later. Trimming of the periphery of the tray is delayed until immediately before the impression is started. The teeth with which the denture is to be completed are mounted on the tray when the tray is tried in the mouth. They remain on the tray during the taking of the impression and during flasking.

A plaster index (Fig. 3) is made of the soaped or greased occlusal third of the teeth mounted on the tray. This plaster index is used as a pattern to check against in case of tooth movement or distortion of the tray. The completed denture should also be checked against this plaster index for tooth movement and distortion.

After the index is made, the soft wax is sectionally removed from the tray and replaced with a hard sticky wax.

The periphery of the tray should be kept clean of wax. The index can be held in place to prevent movement of the teeth during this operation. The incidence of interchange of waxes can be reduced greatly as the operator becomes more familiar with the technic.

The tray is now tried in the mouth. If possible all tray movements caused by raising the cheek, lips and tongue should be eliminated. Overextension is to be guarded against more than underextension. All undercuts should be removed. After the operator has trimmed the tray so that it rests in place properly, he should seat the tray and press down with the forefingers of each hand placed on the occlusal surfaces of the teeth on each side. If there is a slight rise of the tray when the fingers are lifted, the tray is probably a little long in the region of the heel and should be shortened until this rise no longer occurs.

A low fusing compound is used for the impression. If it is thought that the tray has been overtrimmed, high fusing compound can be added in the doubtful areas and low fusing compound worked over it later. The compound is worked as thin as possible during the taking of the impression and if possible compound already on the tray is used instead of adding more. Frequent heating of the compound and tilting of the tray will cause the compound to flow to the desired area. The compound when heated should be tempered by being waved through a two foot area three times. Registration of all areas should show no glossy surfaces, and there should be a firm turnover of compound on the periphery of the tray.

All registrations are made by having the patient close the jaws to centric occlusion. Except in rare instances this is to be a normal closing. Occasionally the operator, to obtain a more positive registration, may ask the patient to bring the jaws tightly together. Any registration taken with the jaws not in centric occlusion must be reheated and retaken. No protrusive movements of the tongue are used at any time.

Buccal registrations are made by a light firm upward pull of the cheeks with the teeth in occlusion. Labial registrations are made by a gentle massage with the teeth in occlusion. All registrations should be rounded. In removing the tray after a registration had been made, the operator should not lift the tray without first lowering the lip to break any suction forces present. The tray should be chilled frequently in cold water, and the teeth should be checked continually against the index. No tests for stability should be made until the impression has been taken carefully in all areas.

The amount of compound heated and applied at one time should equal in area about the surface of a dime. Distally from the cuspids compound should be applied equally on each side, and the registrations of both sides should be obtained at the same insertion.

The first registration is taken with com-

Fig. 4.—Three views of completed impression. Note sublingual registration in A and B. Teeth are held on labial and buccal surfaces by sticky wax

Fig. 5.—Completed dentures: A and B, two views of denture made from impression shown in Figure 4; C, another denture, showing a different sublingual registration. At the end of ten days after insertion, neither of these dentures had needed adjustment

pound applied on each side in the first molar and second bicuspid regions and in the incisor region. The last registration taken is that of the sublingual region. With these two exceptions, I have found no reason to follow any definite procedure in taking the impression by regions.

The impression of the sublingual region seems to be the most important impression as regards stability and retention of the completed denture. As the final step in taking the impression, a liberal amount of compound should be added to the sublingual region from the second bicuspid region on one side to the second bicuspid region on the opposite side and carefully heated, and the registration should be taken. This region should be reworked several times (Fig. 4).

Advantages

Impressions of the lower jaw taken by the closed mouth method produce dentures with the following characteristics (Fig. 5): They are stable in all mandibular movements; they are not dislodged by tongue, cheek or lip movements, by any contact position of the opposing teeth or by the widest of mouth opening actions; they exhibit distinct resistance to lateral pressure on the teeth when the mouth is opened to its widest extent; in some instances they remain firmly seated when a tipping force is applied lingually in the incisor area. There is as a rule little suction when a denture is lifted from the ridge. This lack of suction should be considered a desirable quality as it means that the ridge and the tissues are not being subjected to abnormal pressures which would contribute to a more rapid resorption and shorter ridge life. Later adjustments are surprisingly few. In many instances a polishing of the area in contact with the inflamed region is all that is needed for relief.—*First National Bank Building.*

THE DENTAL IMPLICATIONS OF FLUORINE: A REVIEW OF THE LITERATURE

Willard R. Bellinger, D.D.S., M.P.H., Topeka, Kan.

One of the major problems of modern dental practice is the control of dental caries. For a long time man has been afflicted with dental caries, and few civilized persons escape its attack. In consideration of the prevalence of dental caries, the most hopeful of all means of caries prevention yet considered and investigated is the judicious use of the element fluorine. Fluorine may serve to prevent, ameliorate or cure dental caries.

Many sensational claims have been made for the efficacy of fluorine in the control and prevention of dental caries, and some doubts have been expressed regarding its efficiency and safety. With one conclusion most investigators are in agreement: there is hope that fluorine will provide a partial solution of the problem of dental caries. It also is agreed that much research remains to be completed before fluorine can be accepted as a wholly dependable and practical method of control.

It has been known for many years that water supplies from deep wells and surface waters in certain areas of the country contain fluoride in varying quantities. Attention first was called to these fluoride-bearing waters because they were a menace to dental health, inasmuch as mottling of the enamel developed in the teeth of children reared in fluoride areas. Mild cases of fluorosis showed milky white or light brown spots in the teeth, and the severe cases showed unsightly dark brown patches, with variations between the two extremes (Fig. 1). Mottled enamel is essentially a condition associated with the ingestion of excessive amounts of fluorides present in the water used for drinking and cooking. Credit has been given to Margaret Smith and her associates[1] as the first researchers to produce mottled enamel. Mottled enamel is sometimes observable in certain of the deciduous teeth.[2] It has been accepted generally that fluorine, which modifies the enamel, does so prior to or during the calcification of that tissue and that continued exposure to fluorine in the drinking water after calcification has little effect on the enamel.[3]

It has been found that persons who have lived all of their lives in high fluoride areas, or who have lived in these areas at least the first eight or ten years of life, have less dental caries than persons living in fluoride-free areas. Dean,[4] realizing that too much or too little fluoride was undesirable, set out to determine what proportion of fluoride should be contained in a domestic water supply in order to fortify it for the accomplishment of optimal results. Thorough studies have determined the optimal concentration to be the threshold amount for mottling, one part of fluoride per million parts of water.

In view of the world-wide interest in

A thesis submitted in partial fulfillment of the requirements for the degree of Master in Public Health, University of Michigan, May 1946.

Assistant director, Division of Dental Hygiene, Kansas State Board of Health.

1. Smith, Margaret; Lantz, Edith, and Smith, H. V., The Cause of Mottled Enamel. *Science* 74:244 (September 4) 1931.

2. Smith, Margaret, and Smith, H. V., The Occurrence of Mottled Enamel on the Temporary Teeth. *J.A.D.A.* 22:814 (May) 1935.

3. Cox, J. C., The Fluorine and Dental Caries Problem. *J.A.D.A.* 27:1107 (July) 1940.

4. Dean, H. T., and Elvove, Elias, Further Studies on the Minimal Threshold of Chronic Endemic Dental Fluorosis. *Pub. Health Rep.* 52:1249 (September 10) 1937.

the therapeutic value of fluorine, a review of the literature on fluorine and teeth will be attempted. This review will cover a historical résumé of early fluorine studies, the results of experiments on teeth of animals, the toxicity of fluorides and the relation of the Lactobacillus acidophilus and fluorine. A report of a survey and study of dental caries experience in the fluoride areas of Kansas will be included, and an evaluation will be made of the utilization of fluorine in preventive dentistry.

Mottled Enamel

The condition now known as mottled enamel was first described in 1901, by Eager,[5] who referred to the disease as "black teeth" (dentineri) and "writing on the teeth" (denti scritti). In Naples the disease was thought to be attributable to the drinking water.

From the standpoint of research in dental science, the first study of mottled enamel with the view of determining its cause was made in Colorado Springs, Colo., by the Colorado Springs Dental Society in 1908. Before 1908, according to McKay,[6] there had been no reports in any of the dental journals of the existence of a lesion of the teeth known as mottled enamel. McKay[7] has made a number of exhaustive studies of the subject since his first report.

The first recorded explanation of fluorosis was the observation that the mottling defect of teeth was limited to persons who were native to certain communities in Colorado. An early modification of McKay's conclusion was made when it was noted that the lesion developed in the teeth of children who were born elsewhere and who established residence in the Colorado communities during the period of tooth calcification. The next step was to determine the geographic boundaries of the afflicted district. The determination was accom-

5. Eager, J. M., Denti di Chiaie. *Pub. Health Rep.* 16:2776 (November 1) 1901.

6. McKay, F. S., Mottled Enamel: Early History and Its Unique Features, in Moulton, F. R. (editor), *Fluorine and Dental Health*. Washington: American Association for the Advancement of Science, 1942, p. 1.

7. McKay, F. S. (in collaboration with Black, G. V.), An Investigation of Mottled Enamel. *D. Cosmos* 58:477 (May); 627 (June); 781 (July); 894 (August) 1916.

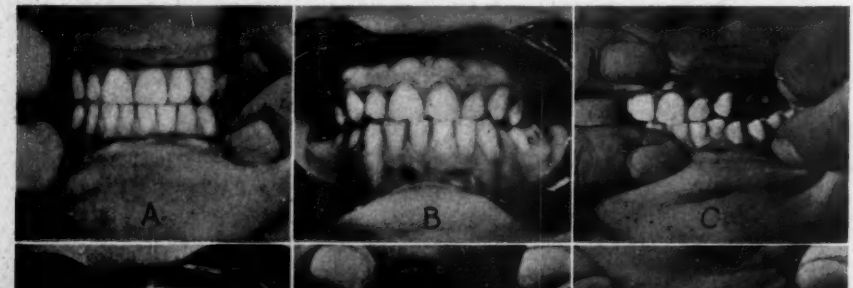

Fig. 1.—Cases of dental fluorosis: A, normal condition; B, questionable dental fluorosis; C, very mild; D, mild; E, moderate; F, severe

plished by making examinations in the outlying school districts. Eventually small villages were reached where the mottling did not appear on the teeth of those persons who were lifelong inhabitants of the village. The only difference that could be observed in these communities was the source of their water supplies. In one community the teeth of the children native to it had 100 per cent mottling and in another community four miles away no mottling was present. The sources of the water supply were different in these two communities. After the surveys were completed, the observers became convinced that in some regions mottling occurred because the children exhibiting it moved into these areas after having been born and raised in areas of fluorosis.

Black,[8] because of his keen interest in, and study of, enamel dystrophies, also exhibited interest in McKay's investigation. He had reported his studies of enamel dystrophies, but it had never occurred to him that the mottling of teeth should be investigated, as he had never seen it nor heard of it. Thereafter, he maintained a vigorous interest in mottled enamel.

Early Studies

Field examinations were extended to many of the western states, and other areas of fluorosis were found. Many new opinions were advanced regarding the cause of fluorosis, but none of them could be proved. The one opinion that seemed to persist was that the influence was contained in the domestic water supply. It was thought that comparative chemical analyses of the waters of the immune and endemic localities would disclose the responsible element. The analyses only added to the confusion. The opinion remained, and evidence supported this conclusion, that mottled enamel was unknown in communities until the domestic supply of water was changed to deep sources. After such changes in water supply, a 100 per cent development of the lesion occurred.

Bauxite, Ark., one of the towns with deep well water, was examined in 1928. As a result of this examination, the Aluminum Company of America, having a commercial interest in the aluminum ore in the region of Bauxite, as well as an active interest in the social and sanitary conditions of the town, was stimulated to make a scientific examination of the community water. Analyses made of the water supply demonstrated the presence of fluorine. Not being satisfied with this report, the company made several analyses, and fluoride was detected in unusual amounts in each analysis. The officials of the company became still more interested and tested water samples from thirty municipalities in various parts of the United States. The results disclosed fluorides present in all samples from the endemic areas and absent, beyond perhaps the merest trace, from nonendemic areas.

Two communities, Oakley, Idaho, and Bauxite, Ark., became the biologic proving grounds for the study of mottled enamel. At the time of the McKay examination of the Oakley water supply, the native population showed 100 per cent affliction with mottled enamel.[6] The Oakley water supply was changed from a warm spring to a cold spring not far distant. Bauxite changed its water supply to a source which, continually used, had produced no mottling. After eight and ten years, respectively, the children born after the change in water supply displayed no evidence of dental fluorosis in either of these cities.

Bunting and others,[9] in a survey of 103 children in Minonk, Ill., in 1928,

8. Black, G. V. (in collaboration with McKay, F. S.): Mottled Teeth—an Endemic Developmental Imperfection of the Teeth, Heretofore Unknown in the Literature of Dentistry. *D. Cosmos* 58:129 (February) 1916.

9. Bunting, R. W.; Crowley, Mary; Hard, Dorothy, and Keller, Margaret, Further Studies of the Relation of Bacillus Acidophilus to Dental Caries. *D. Cosmos* 70:1002 (October) 1928.

were among the first to establish a direct relation between mottled enamel and dental caries.

These early studies of the areas of fluorosis provided the information that the water supply was the cause of the mottling of the teeth and that fluorine was present in the water in significant quantities. At that time nobody foresaw the ramifications of the study of fluorine and fluorosis.

Effect of Fluorine on Animal Teeth

Findings in experiments on animals have given additional import to the hypothesis that fluorine is the cause of mottled enamel. Miller's observations[10] in experiments on rats indicate that both sodium fluoride and iodoacetic acid added to caries-producing diets for rats result in a low incidence of dental caries as compared with a control group on the same diet without the addition of either sodium fluoride or iodoacetic acid. Miller in his experiments was the first to show the effect of fluorine on dental caries in rats. Studies of rats by McClure and Arnold[11] and by Finn and Hodge[12] have shown that the process or processes involved in the production of dental caries can be altered by the presence of fluoride in the drinking water or in the food. It has been suggested that the fluoride ion either acts as an antienzymatic agent or produces a more resistant tooth substance. It is not known whether the action is local, systemic or both.

McClure[13] has shown that a reduced caries experience maintains when fluorine is added to the diet of rats. There is also a direct correlation between fluorine content of molar teeth in rats and the amount of fluorine added to the diet. Cox and others[14] report an increased resistance of teeth to caries in rats which had ingested optimal amounts of fluorine.

Changes in the incisors of rats produced by the addition of fluoride to the diet were noted by McCollum and others.[15] Sodium fluoride, 226 p.p.m. (parts per million), was added to the stock diet, resulting in bleaching, mottling, brittleness and overgrowth of the incisors. The upper incisors grew backward in a circle and finally penetrated the roof of the mouth. The lower incisors wore away too easily. During this period, Schultz and Lamb[16] reported similar changes in the teeth of rats.

Perry and Armstrong[17] found that, in rats fed water containing 20 p.p.m. fluoride, the enamel of the teeth contained 36 per cent more fluorine than the teeth of control animals. The fluorine in dentin of both groups of animals was not significantly different. For this reason, Perry and Armstrong concluded that it seems unlikely that the fluorine could reach the enamel through the dentin without fluorine in the dentin being increased, and it is highly probable that the increased fluorine in the molar enamel of test animals was absorbed through the surface of the enamel exposed to the oral cavity.

Hodge and Sognnaes[18] stated that dental caries in rats is reduced by large doses of fluorides whether given in the drinking water or mixed in the solid diet. Fluorides are most effective against den-

10. Miller, B. F., Inhibition of Experimental Dental Caries in the Rat by Fluoride and Iodoacetic Acid. *Proc. Soc. Exper. Biol. & Med.* 39:389 (November) 1938.

11. McClure, F. S., and Arnold, F. A., Jr., Observations on Induced Dental Caries in Rats. I. Reduction by Fluorides and Iodoacetic Acid. *J. D. Res.* 20:97 (April) 1941.

12. Finn, S. B., and Hodge, H. C., The Inhibition of Experimental Dental Caries by Fluorine. *J. D. Res.* 18:259 (June) 1939.

13. McClure, F. S., Effect of Fluoride on Rat Caries and on Composition of Rats' Teeth. *J. Nutrition* 22:391 (October) 1941.

14. Cox, G. J., and others, Experimental Dental Caries. IV. Fluorine and Its Relation to Dental Caries. *J. D. Res.* 18:481 (December) 1939.

15. McCollum, E. V., and others, Effect of Addition of Fluorine to Diet of Rat on Quality of Teeth. *J. Biol. Chem.* 63:553 (April) 1925.

16. Schultz, J. A., and Lamb, A. R., The Effect of Fluorine as Sodium Fluoride on the Growth and Reproduction of Albino Rats. *Science* 61:93 (January 23) 1925.

17. Perry, M. W., and Armstrong, W. D., On Manner of Acquisition of Fluorine by Mature Teeth. *J. Nutrition* 21:35 (January) 1941.

18. Hodge, H. C., and Sognnaes, Reider, Experimental Caries and a Discussion of the Mechanism of Caries Inhibition by Fluorine. *J. Am. Col. Den.* 12:57 (March) 1945.

tal caries in rats when given by mouth, less effective by topical application and apparently ineffective when injected subcutaneously.

Recently it has been demonstrated by Dale, Lazansky and Keys[19] that fluorides are rather effective in cutting down the incidence of caries in teeth of the Syrian hamster. This is important because dental caries develops in hamsters on finely ground diets as well as in those on coarse diets. Furthermore, hamster teeth are much more like human teeth than are rats' teeth because they have enamel covered cusps and shallow occlusal grooves. In addition, caries in hamsters develops on all surfaces of the teeth and, therefore, resembles caries in human beings also in this respect. A study of fluorine and dental caries in hamsters deserves much greater attention. The results of the experiments by Dale and his associates confirm the reports by Arnold[20] in 1942.

In order to eliminate the local action of fluorine as far as its presence in food and drinking water is concerned, Arnold and McClure[21] experimented by administering sodium fluoride to rats by subcutaneous injections. The dental caries experience of rats given injections of sodium fluoride was compared with a control group and with a group receiving 10 p.p.m. fluoride in drinking water. The fluorine content of the enamel and dentin was increased in the incisor and molar teeth of rats by subcutaneous injection of sodium fluoride and by the feeding of water containing 10 p.p.m. fluorine. Although the fluorine content of the molar teeth of rats given injections of sodium fluoride was increased, these teeth did not show increased resistance to caries.

19. Dale, P. P.; Lazansky, J. P., and Keys, P. H., Production and Inhibition of Dental Caries in Syrian Hamsters. *J. D. Res.* 23:445 (December) 1944.

20. Arnold, F. A., Jr., The Production of Carious Lesions in the Molar Teeth of Hamsters (C. Auratus) *Pub. Health Rep.* 57:1599 (October 23) 1942.

21. Arnold, F. A., Jr., and McClure, F. J., Observations on Induced Dental Caries in Rats. II. The Effect of Subcutaneous Injection of Fluoride. *J. D. Res.* 20:457 (October) 1941.

Cheyne,[22] experimenting on the production of fluorosis in enamel in the molars of the rat, utilized forty-three animals given graded doses of potassium fluoride. The results showed that it is possible to produce mottling of teeth in young rats during the period of growth and calcification of the teeth. Mild mottling was produced with doses as small as 150 p.p.m. of fluoride; concentration of fluoride varying from 350 to 550 p.p.m. produced macroscopic hypoplasia with pitting.

In summarizing the effects of fluorine on teeth of pigs, Roholm[23] discovered hypoplastic, defectively calcified enamel and dentin in teeth which calcified during the ingestion of fluorine. The teeth formed prior to the experiment were unchanged. In experimenting on rats, he noted a deleterious effect on tooth formation resulting in more or less diffusely chalky-white enamel with irregular surfaces. The upper incisors increased in length; the lower incisors diminished in length.

A demonstration by Hodge and Finn[24] disclosed that rats fed casein plus fluorine had 60 to 70 per cent less caries and diminished fracture experience as compared with groups fed powdered milk and plain casein.

Fluoride Intoxication

Fluoride intoxication must be considered not only by the effect of fluorides on the teeth but also by the effect of fluorides on other parts of the body. Fluorides are protoplasmic poisons. They are used extensively to kill insects, and ingestion of them beyond certain limits is known to be fatal to animals. Many substances which are poisonous in large amounts are highly beneficial in small

22. Cheyne, V. D., Production of Graded Mottling in Molar Teeth of Rats by Feeding of Potassium Fluorides. *J. D. Res.* 21:145 (April) 1942.

23. Roholm, Kaj, *Fluorine Intoxication.* London: H. K. Lewis & Co., Ltd., 1937.

24. Hodge, H. C., and Finn, S. B., Reduction in Experimental Rat Caries by Fluorine. *Proc. Soc. Exper. Biol & Med.* 42: 318 (October) 1939.

doses. Chlorine, for example, is added almost universally to public water supplies to make them safe for drinking. Iodine, also potentially poisonous, is added to table salt, and to water in some areas, to prevent goiter.

A urinary fluorine study has been made by McClure and Kinser.[25] In a group of 1,900 young men and high school boys from both fluoride-free and high fluoride areas, they found a remarkable relation between urinary fluorine and fluorine content of domestic water. Fluorine in urine continues proportional to the fluorine in the water up to about 5.0 p.p.m. fluorine in the local water supply. In fluorine-free areas, the fluorine present in urine averages 0.3 to 0.5 p.p.m.; an increase of fluorine in urine was associated with the use of domestic waters containing as little as 0.5 p.p.m. of fluorine. These studies indicate that fluorine present in drinking water in concentrations up to 4.0 or 5.0 p.p.m., when ingested by men and boys in the age groups studied, is largely eliminated in the urine. Since elimination of absorbed fluorine is practically complete when quantities absorbed do not exceed 4 or 5 mg. daily, a person drinking water containing 1 p.p.m. of fluoride and consuming solid food containing 0.1 to 1 p.p.m. of fluoride would take in less than 2 mg. of fluorine daily, an amount well below the average at which there may be appreciable hazard to body storage.

Interest has been directed to the effect on the skeletal system of fluorides when taken over long periods of time. A study was made by McClure[26] of 1,458 high school boys and 2,529 young men prior to induction in the armed forces. These boys or young men came from communities where the concentration of fluoride in the potable waters ranged from 0.1 to 5.6 p.p.m. Among the high school boys, a history of bone fractures was secured with no evidence to indicate that fluoride was the cause. The same lack of relation also applied to their height and weight when compared with acceptable standards for height and weight. McClure stated:

> While these data on bone fracture experience for both men and boys of these ages do not permit final conclusions, they do suggest strongly that no serious impairment in skeletal performance, as might be manifest in a number of broken bones, seems related to exposure of fluoride domestic waters of the concentration studied in this survey.

In a study on a human experimental subject by Machle, Scott and Largent,[27] the mean daily intake of fluoride was established at levels between 0.5 and 1.5 mg., and ingestion of fluoride up to 1.5 mg. a day presented no evidence of ill effects. Eighty per cent of the fluoride was absorbed and excreted in the urine. The amounts of fluoride and chloride excreted in the feces were small in relation to the amounts lost in the urine.

Bäuer,[28] experimenting on dogs, reported that chronic fluorine poisoning produced an involvement of the bones of dogs. The extent of the involvement depended on the age of the animal, the dosage and the length of time that the fluorine was administered. Experimenting with puppies, he noted that there was a periosteal bone deposition prior to any alteration of the tooth buds.

Roholm[23] has reported that a disease which he termed osteosclerosis developed in persons working with cryolite after long periods of continued exposure to fluorine. He described this condition as a disease which attacks bone and is characterized pathologically as a diffuse type in which the pathologic formation starts in both the periosteum and the en-

25. McClure, F. J., and Kinser, C. A., Fluoride Domestic Waters and Systemic Effects. *Pub. Health Rep.* 59:1575 (December 8) 1944.

26. McClure, F. J., Fluoride Domestic Waters and Systemic Effects. *Pub. Health Rep.* 59:1543 (December 1) 1944.

27. Machle, Willard; Scott, E. W., and Largent, E. J., The Absorption and Excretion of Fluorides. *Indust. Hyg. & Toxicol.* 24:199 (September) 1942.

28. Bauer, W. H., Experimental Chronic Fluorine Intoxication: Effect on Bones and Teeth. *Am. J. Orthodont. & Oral Surg.* 31:700 (December) 1945.

dosteum. The compacta densifies and thickens; the spongiosa trabeculae thicken and fuse together. The medullary cavity decreases in diameter, and new bone forms from the periosteum. There is also calcification of the ligaments. The weight of the bones increases up to three times the normal.

L. Acidophilus Counts

A number of investigators[29-37] have reported a close correlation between L. acidophilus counts and the incidence of dental caries. Arnold[38] stated: "It has been more or less generally accepted that whenever dental caries has been inhibited or prevented, there is an accompanying change in the oral flora as measured by L. acidophilus counts on the saliva."

Since it has been shown[39, 40] that there is a reduced L. acidophilus count in mouths with a lowered incidence of caries and that there is an inverse ratio between caries incidence and a higher fluorine content in domestic water supplies, it is reasonable to expect a lower L. acidophilus count in areas of higher fluorine concentration.

Bibby and Van Kesteren[41] tested the action of solutions with various concentrations of sodium fluoride on the growth and acid production of streptococci, lactobacilli and other mouth organisms. They found that concentrations of less than 1 p.p.m. of fluorine limited acid production by bacteria; concentrations in excess of 250 p.p.m. of fluorine are needed to affect bacterial growth. In persons with fluorosis and fluorine-treated enamel and dentin, acid production by bacterial cultures is also reduced.

Jay and Arnold,[42] in a study comparing L. acidophilus counts in fluoride and nonfluoride areas, noted that the most striking differences were in ranges 0 to 100 and in counts greater than 20,000. In areas using water containing more than 1 p.p.m. fluoride, those cases in which counts were in the 0 to 100 range averaged 37.4 per cent of the population, as compared with 16.1 per cent in the nonfluoride area. In an area with water containing 0.5 p.p.m. of fluoride, the percentage of cases with low counts was 21.2. The counts which were higher than 20,000 averaged 27.5 per cent for areas using water containing 1 p.p.m. fluoride and 52.4 per cent for nonfluoride areas. These studies show that L. acidophilus counts vary inversely to fluorine content.

Jay[43] stated:

> In Elgin, Ill. (Dean *et al.*, 1942), 0.5 p.p.m. of fluoride occurring naturally in the water was associated with low lactobacillus counts

29. Dean, H. T., and others, I. Dental Caries Study, Including L. Acidophilus, Estimations of Population Severely Affected by Mottled Enamel and Which for Past Twelve Years Has Used Fluoride-Free Water. *Pub. Health Rep.* 56:365 (February 28) 1941.

30. Hill, T. J., A Salivary Factor Which Influences the Growth of L. Acidophilus and Is an Expression of Susceptibility or Resistance to Dental Caries. *J.A.D.A.* 26:239 (February) 1939.

31. Dean, H. T., and others, Domestic Water and Dental Caries Including Certain Epidemiological Aspects of Oral L. Acidophilus. *Pub. Health Rep.* 54:862 (May 26) 1939.

32. Arnold, F. A., Jr., and McClure, F. J., A Study of the Relationship of Oral Lactobacillus Acidophilus and Saliva Chemistry to Dental Caries. *Pub. Health Rep.* 56:1493 (July 25) 1941.

33. Becks, Hermann; Jensen, A. L., and Millarr, C. B., Rampant Dental Caries Prevention and Prognosis. *J.A.D.A.* 31:1189 (September 1) 1944.

34. Jay, Philip, and Voorhees, R. S., Jr., Bacillus Acidophilus and Dental Caries. *D. Cosmos* 69:977 (October) 1927.

35. Bunting, R. W., and Palmerlee, Faith, The Role of Bacillus Acidophilus in Dental Caries. *J.A.D.A.* 12:381 (April) 1925.

36. Dean, H. T., and others, Domestic Water and Dental Caries. II. Study of 2,832 White Children, Aged 12-14, of Eight Suburban Chicago Communities, Including Lactobacillus Acidophilus Studies in 1,761 Children. *Pub. Health Rep.* 56:761 (April 11) 1941.

37. Arnold, F. A., Jr.; Dean, H. T.; and Singleton, D. E., Jr., The Effect on Caries Incidence of a Single Topical Application of a Fluoride Solution to the Teeth of Young Adult Males of a Military Population. *J. D. Res.* 23:155 (June) 1944.

38. Arnold, F. A., Jr., Role of Fluorides in Preventive Dentistry. *J.A.D.A.* 30:499 (April 1) 1943.

39. Dean, H. T., Endemic Fluorosis and Its Relation to Dental Caries. *Pub. Health Rep.* 53:1443 (August 19) 1938.

40. Deatherage, C. F., Fluoride Domestic Waters and Dental Caries Experience in 2,026 White Illinois Selective Service Men. *J. D. Res.* 22:189 (April) 1943.

41. Bibby, B. G., and Van Kesteren, M., The Effect of Fluorine on Mouth Bacteria. *J. D. Res.* 19:391 (August) 1940.

42. Jay, Philip, and Arnold, F. A., Jr., Epidemiological Aspects of Oral Lactobacillus Counts in Fluoride and Non-Fluoride Areas. *J. Am. Col. Den.* 12:54 (March) 1945.

43. Jay, Philip, Fluorine and Dental Caries with Special Reference to L. Acidophilus, in Moulton, F. R. (editor), *Fluorine and Dental Health*. Washington: American Association for the Advancement of Science, 1942, p. 63.

while in the laboratory 20.0 p.p.m. of fluoride was required in culture media before any significant effect on bacterial growth was observed. This suggests the possibility that, in order to be effective, fluorine must be present in some particular, as yet undetermined, combination.

Consideration should be given, not only to the possibility that fluorine, to be effective, must be present in some particular, as yet undetermined, combination, but also to the possibility that factors other than the fluorine content of the water may have some influence on the amount of caries activity found in teeth.

Deatherage and others,[44] comparing two areas having identical fluorine content in the drinking waters, found that the area in which the drinking water had a mineral content of 350 p.p.m. showed a caries incidence rate twice that of the other community studied, with water having a mineral content of 1,900 p.p.m.

Jay[45] stated that there is no correlation between caries incidence and water hardness.

Fluorine and Caries in Kansas

In 1938, much attention was given to the subject of fluorine as a cause of mottled enamel in Kansas school children. Dental surveys were made in western Kansas which supplied contributory evidence that fluorine may be an inhibitory factor in the control of dental caries.[46] During 1945, a renewed interest developed in the fluorine-dental caries experience in the state of Kansas. A study was made to determine the number of dentists in the western (thirty-one counties), central (thirty-seven counties) and eastern (thirty-seven counties) thirds of the state in relation to the population of these respective areas. A study also was made to determine the number of children in these three areas in relation to the number of dentists available to care for children's dental needs.

The relations were found to be: western third, 50 dentists, 2,881 persons per dentist, 900 preschool and school children per dentist; central third, 365 dentists, 2,071 persons per dentist, 493 preschool and school children per dentist; eastern third, 393 dentists, 2,269 persons per dentist, 537 preschool and school children per dentist. There were almost twice as many children per dentist in the western third as in either of the other two sections of the state.

Another study was made of a previously conducted survey of the entire state (Fig. 2). The survey determined the amount of fluorine present in the public water supplies of each of the 105 county seats in the state, and an average was found for each of the three areas of the state. The western third was found to average 0.90 p.p.m. of fluorine; the central third, 0.41 p.p.m., and the eastern third, 0.35 p.p.m.

Several suppositions were drawn from this review of the information found previously:

1. The dentists in the western third of the state, having approximately twice as many children to treat per dentist as the dentists in the rest of the state, may be practicing much more dentistry for children than the dentists of the eastern or central thirds of the state.

2. The children in the western third of the state may not be receiving the same amount of dental services, owing to the larger patient load per dentist.

3. The children of the western third of the state may not have the same dental caries rate as the children in the other sections of the state, possibly owing to the higher amount of fluorine in the domestic water supplies.

As has been pointed out in reports, an inverse relation may be expected be-

44. Deatherage, C. F.; Klassen, C. W., and Weart, I. G., Fluorides and Mottled Enamel in Illinois. *Illinois D. J.* 8:194 (May) 1939.

45. Jay, Philip, Personal communication, June 4, 1946.

46. Kramer, L. R., Findings in Surveys on Vincent's Infection and Mottled Enamel in Kansas. *J.A.D.A.* 25:303 (February) 1938.

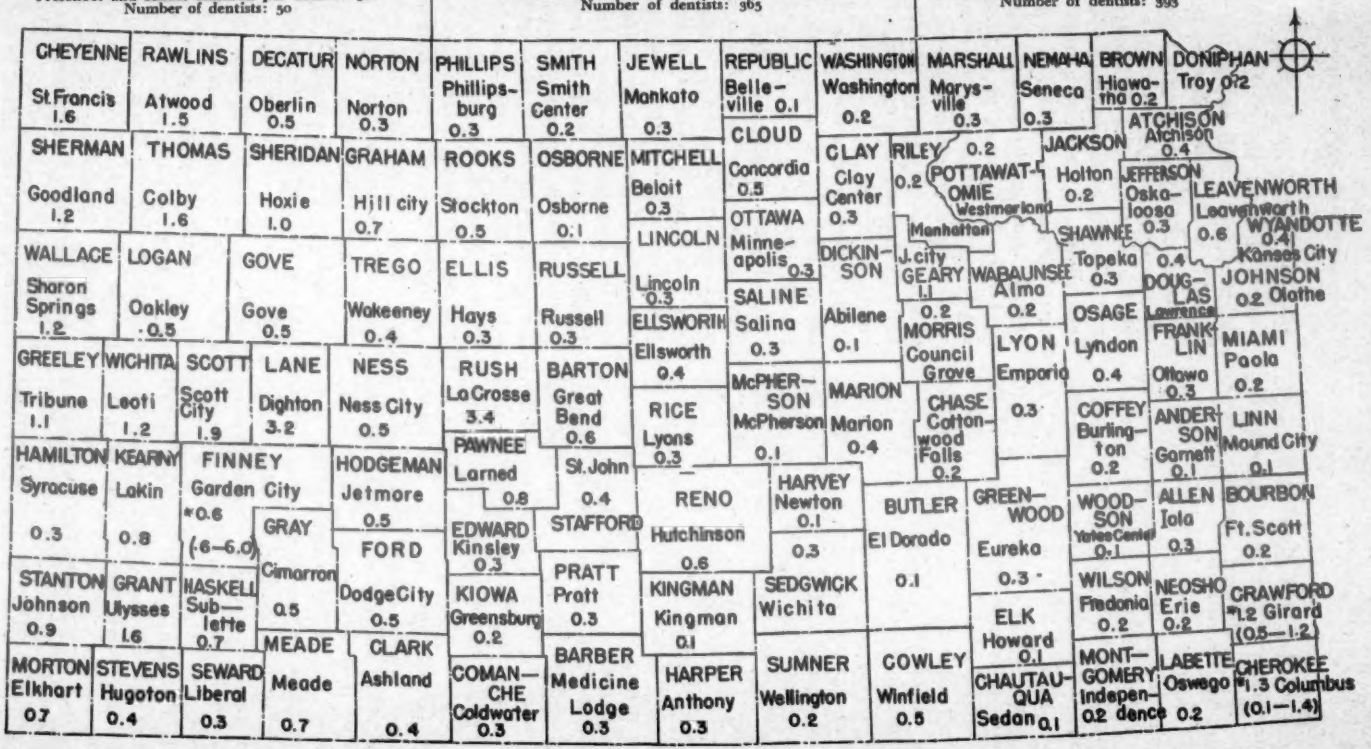

Fig. 2.—Fluorine distribution in Kansas and child and adult population per dentist

tween the fluoride content of the public water supply and the dental caries experience of those children continuously using such waters.[47, 48]

In order to determine the public health significance of the varying conditions in the different sections of Kansas, a survey was made of three representative counties in the western third of the state (Greeley, 1.1 p.p.m. of fluorine; Sheridan, 1.0 p.p.m., and Gray, 0.5 p.p.m.). The domestic water supply in all three counties is obtained from deep wells.

An examination with a mouth mirror and explorer was made of 2,000 school children in the western third of the state. The survey was made by the assistant dental director in the presence of the county nurses and the principals of the city schools. The fluorine content of the water supplies for the three counties averaged 0.87 p.p.m., which is close to the average of 0.9 p.p.m. for the entire western third.

In each county an average of 100 children was taken from each of the grades one to twelve. The examination established a DMF rate in both the permanent and the deciduous teeth. Included also were the percentage of diseased and abscessed teeth, the percentage of children with mottled enamel and the number of teeth without defects (Table 1).

For comparative analysis, the results from a similar examination, made in 1939, of 1,200 school children in the eastern third of the state were utilized (Table 2). These examinations were made under the same instructions as those of the western third of the state, except that cases of mottled enamel among children in the eastern third were not recorded.

In a comparison of the total DMF rate of the first eight grades, these data show that there was a total of 1,720 decayed, missing or filled teeth in the western third of the state for the 800 children, or a DMF rate of 2.17. The children in the eastern third of the state had 3,198 decayed, missing or filled teeth, or an average of 3.97. A comparison of the DMF rate of the permanent teeth only in the first eight grades showed that the children of the western third of the state experienced a DMF rate of 0.64, and the rate in the eastern third was 2.03. The high school group showed a much greater variance when the two sections were compared. The group of children in the western third of the state had 698 decayed, missing or filled teeth, or an average of 1.7, and the children in the eastern third of the state had 2,204 decayed, missing or filled teeth, or an average of 5.51.

In the examination in the western third of the state, several interesting conditions were noted. Few of the children examined had defective anterior teeth. The posterior teeth were attacked principally in the pits and fissures, as indicated by the restorations and cavities. The largest number of cavities found in permanent teeth in one mouth was eight. Two 17-year-old high school girls with a total of nineteen restorations and ten cavities had used rain water all of their lives as a source of their water supply. The survey revealed mottled enamel light to moderate in sixteen out of 100 children, and severe mottling in one out of 100 children. This finding would indicate that some of the private water supplies from wells may have contained more than 1.0 p.p.m. of fluorine.

After a study of these data on DMF rates in the two sections of the state, it was concluded that the fluorine content in the domestic water supply was largely responsible for the lower dental caries rate in the western third of the state as compared with the rate in the eastern third of the state. Since the rate of caries is approximately one-third less in the permanent teeth of children in the west-

47. Ockerse, T., Endemic Fluorosis in Kinhardt and Gordonia District, Cape Province, South Africa. *J.A.D.A.* 28:936 (June) 1941.

48. Bull, F. A., The Role of Fluorine in Dental Health. *J.A.D.A.* 30:1206 (August 1) 1943.

ern third of the state, the ratio of preschool and school children to dentists in that area does not appear as unbalanced as it was first thought to be.

Fluorine in Preventive Dentistry

The causes of dental caries have been quite well established, but determining ways and means of preventing carious lesions is still a paramount problem. There would be world-wide rejoicing if current hopes of fluorine as a preventive of dental caries should be fully realized. Meanwhile, constructive scientific skepticism should be applied to every finding in order to facilitate thorough research and to prevent the consequences of hasty judgment.

In the past few years, public health workers have shown an increased interest in preventive dentistry. This interest gained impetus from reports on the dental conditions of men called into the armed services. These reports indicate clearly that some practical and efficient method of control or prevention of dental caries in large population groups is highly desirable. At the present time, there is evidence that dental caries can be controlled in individual cases either by the reduction of refined carbohydrates in the diet or by the detection and early treatment of carious lesions. The latter treatment is a method to prevent the sequelae of the disease, namely, the loss of teeth. However practical such methods may be in individual cases, it is doubtful that such procedures can be applied with any degree of success, especially at present, to large groups.

Recent epidemiologic studies have indicated the possibility of a practical and efficient method of markedly reducing the prevalence of dental caries in large population groups by the addition of minute amounts of fluorides to public water supplies.

Dean and others,[31] in a study in central Illinois, found that children born and reared in Galesburg, where the water contained 1.8 p.p.m. of fluoride, had a dental caries rate (the number of teeth per 100 children which show signs of caries experience) about one-third as high as did comparable children from the community of Quincy, where the water supply was practically fluoride free.

Another epidemiologic study of fluoride and dental caries of school children from eight suburban Chicago communities is reported by Dean and others.[36] The communities studied were much alike. The methods followed in the study were uniform. The one outstanding difference was in the fluoride content of the water supplies, which made it difficult to ascribe the observed differences to any source other than the common water supply. The summary of the dental caries findings and the fluorine content of the public water supply may be found in Table 3. This table shows the inverse relation between the fluorine content of the public water supply and the number of teeth attacked by caries. A comparison of the Elmhurst examination (1.8 p.p.m. of fluoride) with those of Evanston, Oak Park and Waukegan (free of fluorine) showed two to three times fewer cavities in the teeth of the children of Elmhurst.

In a later study[49] of 4,425 white children of thirteen cities of four states, again there was an inverse relation between the amount of fluorine in drinking water and the amount of dental caries. Children in the cities with 1 p.p.m. of fluoride or more in the water supply had only one-third to one-half the cavities that children had who resided in cities having a fluoride content of less than 0.5 p.p.m. in the water supply. It is interesting to note that the report shows that the reduction in caries in the fluoride area was much more marked in the upper incisors

49. Dean, H. T.; Arnold, F. A., Jr.; and Elvove, Elias, Domestic Water and Dental Caries. V. Additional Studies of Relation of Fluoride Domestic Waters to Dental Caries Experience in 4,425 White Children, Age 12-14 Years, of Thirteen Cities of Four States. *Pub. Health Rep.* 57:1155 (August 7) 1942.

Table 1.—Decayed, missing and filled teeth in a random sample of 2,000 school children in grades one to twelve in three counties in the western third of Kansas

1	2	3		4		5	6	7	8		9		10		11		12	13	14	15
Grade	Number of children	Diseased teeth		Filled teeth		Missing teeth	Total DMF	Number per child DMF	Temporary teeth attacked		Permanent teeth attacked		Unfilled teeth		Filled teeth		Diseased gums and abscessed teeth	Mottled enamel cases	Without defects	DMF rate per child (permanent)
									Number	Number per child	Number	Number per child	Number per child		Number per child					
		T*	P†	T	P								T	P	T	P				
One	100	168	7	32	0	0	207	2.1	200	2.0	7	0.07	1.7	0.07	0.32	0.00	2	4.4	42	0.07
Two	100	192	11	45	6	0	252	2.5	237	2.4	17	0.17	1.9	0.11	0.45	0.06	0	9.5	36	0.2
Three	100	168	25	53	9	0	375	3.8	221	2.2	34	0.34	1.7	0.25	0.53	0.09	0	19.4	32	0.34
Four	100	161	26.5	32	18	.5	238	2.4	193	1.9	45	0.45	1.6	2.7	0.32	0.18	.5	18.4	32	0.45
Five	100	98	33	30	21	3	185	1.9	128	1.3	57	0.57	0.98	0.33	0.30	0.21	2	20.5	32	0.57
Six	100	51	28	23	51	8	161	1.6	74	0.7	87	0.87	0.51	0.28	0.23	0.51	1	26.7	36	0.87
Seven	100	28	46	10	53	8	145	1.5	38	0.4	107	1.1	0.28	0.46	0.10	0.53	2	22	43	1.1
Eight	100	6	64	4	69	14	157	1.6	10	0.1	147	1.5	0.06	0.64	0.04	0.69	3	22	43	1.5
Total	800	872	240.5	229	227	33.5	1720	2.17	1101	1.7	501	0.62	1.09	0.60	0.29	0.28	10.5	17.8	296	0.64
Nine	100	.....	42	.....	113	16	171	1.7	.....	.....	155	1.6	.....	0.42	.....	1.13	2	14.7	32	1.7
Ten	100	.....	47	.....	117	22	186	1.8	.....	.....	164	1.6	.....	0.47	.....	1.17	5	19.5	40	1.8
Eleven	100	.....	50	.....	152	17	219	2.2	.....	.....	202	2.0	.....	0.50	.....	1.52	3	21.5	36	2.2
Twelve	100	.....	34	.....	63	25	122	1.2	.....	.....	97	1.0	.....	0.34	.....	0.63	3	14.4	36	1.2
Total	400	.....	171	.....	445	80	698	1.72	*....	.....	618	1.7	.....	0.43	.....	1.11	13	17.5	144	1.7

*Temporary. †Permanent.

Table 2.—Decayed, missing and filled teeth in a random sample of 1,200 school children in grades one to twelve in eastern third of Kansas

1	2	3		4		5	6	7	8		9		10		11		12	13	14	15
Grade	Number of children	Diseased teeth		Filled teeth		Missing teeth	Total DMF	Number per child DMF	Temporary teeth attacked		Permanent teeth attacked		Unfilled teeth		Filled teeth		Diseased gums and abscessed teeth	Malocclusion	Without defects	DMF rate per child (permanent)
									Number	Number per child	Number	Number per child	Number per child		Number per child					
		T	P	T	P								T	P	T	P				
One	100	304	26	49	4	0	383	3.8	353	3.5	30	.3	3.0	.26	.49	.04	13	6	23	.3
Two	100	335	64	41	6	0	446	4.5	376	3.8	70	.7	3.35	.64	.41	.06	15	22	10	.7
Three	100	288	83	59	21	3	454	4.5	347	3.5	104	1.04	2.9	.83	.59	.21	20	16	9	1.08
Four	100	187	130	50	52	14	433	4.3	237	2.4	182	1.8	1.9	1.3	.5	.52	14	17	12	1.96
Five	100	123	167	44	45	17	396	4.0	167	1.7	212	2.1	1.2	1.7	.44	.45	14	12	16	2.29
Six	100	55	180	15	82	11	344	3.4	70	.7	262	2.6	.55	1.8	.15	.82	9	21	13	2.74
Seven	100	14	241	7	94	27	383	3.8	21	.2	335	3.4	.14	2.4	.07	.94	10	16	16	3.62
Eight	100	6	225	1	88	39	359	3.6	7	.07	313	3.1	.06	2.3	.01	.88	22	22	14	3.52
Total	800	1312	1116	266	392	111	3198	3.97	1578	1.97	1508	1.88	1.6	1.4	.33	.49	117	132	113	2.03
Nine	100	.....	236	.....	194	64	494	4.9	.....	.....	430	4.3	.....	2.36	.....	1.94	18	28	22	4.9
Ten	100	.....	282	.....	187	46	515	5.1	.....	.....	469	4.7	.....	2.82	.....	1.87	10	20	10	5.1
Eleven	100	.....	251	.....	284	54	589	5.9	.....	.....	535	5.35	.....	2.51	.....	2.84	10	28	14	5.9
Twelve	100	.....	241	.....	316	49	606	6.1	.....	.....	557	5.6	.....	2.41	.....	3.16	12	34	8	6.1
Total	400	.....	1010	.....	981	213	2204	5.51	.....	.....	1991	4.98	.....	2.52	.....	2.45	50	110	54	5.51

Table 3.—Summary of dental caries findings in 2,832 selected white children, aged 12-14 years, in eight suburban Chicago communities in relation to fluoride content of public water supply (data taken from Dean and others[36])

	Elmhurst	Maywood	Aurora	Joliet	Elgin	Evanston	Oak Park	Waukegan
Number of children examined	170	171	633	447	403	256	329	423
	Deep wells					Lake Michigan		
Total hardness in parts per million	323.4	75.0	328.5	349.3	102.6	131.0	132.2	134.4
Mean fluoride content, 1939-1940, in parts per million	1.8	1.2*	1.2	1.3	0.5	0.0	0.0	0.0
Clinical examination:								
Dental caries experience, permanent teeth, per hundred children examined	252	258	281	323	444	673	722	810
Dental caries experience, proximal surfaces, upper incisors, per hundred surfaces	0.60	0.59	0.78	1.3	4.1	10.7	9.0	17.7
First permanent molar mortality, per hundred children examined	11.8	11.7	14.5	19.5	20.3	42.6	31.0	79.9
Percentage of children with no dental caries experience	25.3	29.8	23.5	18.3	11.4	3.9	4.3	3.1
Percentage incidence of endemic dental fluorosis (mottled enamel)	40.0	33.3	15.0	25.3	4.2	1.6	0.6	0.2

*There is both presumptive and direct evidence that, prior to a few years ago, the Maywood water contained 1.4 to 1.6 p.p.m. of fluoride.

than in other teeth. Arnim, Aberle and Pitney[50] failed to find a single carious incisor in the 1,605 permanent incisors examined in an area of endemic fluorosis.

Deatherage,[40] in a study of 2,026 white men from Illinois called by selective service, found a lower caries experience and a higher rate of teeth with no caries experience in those men using either type of fluoride water (0.5–0.9 p.p.m. of fluoride and 1.0 p.p.m. of fluoride and above) when compared with those using fluoride-free domestic waters (0.0–0.1 p.p.m. of fluoride). He remarks that "other factors being essentially the same, it is reasonable to assume that the marked difference in dental caries experienced by the several groups is attributable to the differences in the fluoride content of the domestic waters used."

Topical Applications of Sodium Fluoride

This fluorine-dental caries hypothesis, with the assumption by Perry and Armstrong[17] that fluorine is absorbed by the enamel surfaces that are exposed to water containing fluorine, and the demonstration by Armstrong and Brekhus[51] that a higher fluorine content is found in sound enamel than in carious enamel, seems to indicate that the acquired properties make the tooth more resistant to decay. This assumption has been responsible for the stimulation of investigators to try other avenues of approach to test further

50. Arnim, S. S.; Aberle, S. D., and Pitney, E. H., A Study of Dental Changes in a Group of Pueblo Indian Children. *J.A.D.A.* 24:478 (March) 1937.

51. Armstrong, W. D., and Brekhus, P. J., Possible Relationship Between Fluorine Content of Enamel and Resistance to Dental Caries. *J. D. Res.* 17:393 (October) 1938.

the inhibitory effect of fluorides. Armstrong and Brekhus state that "the mean fluorine content of the enamel of sound and carious teeth has been found to be 0.0111 and 0.0069 per cent respectively."

Bibby[52] and Cheyne[53] made investigations to determine the caries-inhibiting effect of topical application of fluorides to children's teeth. Bibby reported the topical application of a 1:1,000 sodium fluoride solution to the permanent teeth of 100 children, aged 10 to 13 years. Cheyne's observations were made on the application of approximately 1 cc. of a 500 p.p.m. aqueous potassium fluoride solution, at each treatment, to the deciduous teeth of twenty-seven children, aged 4½ to 6 years. Over a two year period, Bibby reported a reduction in the incidence of caries of more than a third. Cheyne reported a 50 per cent reduction in the incidence of caries. Cheyne concluded:

> The relative frequency of occurrence of lesions and the carious activity of such lesions in the teeth studied in the fluorine and the control group suggest that fluorine acts to prevent the initial involvement of these teeth as well as to retard their subsequent progressive destruction by caries.

Experimenting with topically applied sodium fluoride, Knutson and Armstrong[54] observed a 40 per cent reduction in the annual incidence of caries after the application of a 2 per cent sodium fluoride solution to the teeth of 289 children, aged 7 to 15 years. The second group of 326 children serving as a control group did not receive the fluoride treatments. Knutson and Armstrong also found that the treatment was more effective in the prevention of caries in the upper teeth than in the lower teeth. The experiment gave no evidence that the treatment with sodium fluoride resulted in an arrest of active caries. Knutson and Armstrong,[55] after a two year study of topical application of sodium fluoride, again reported a 40 per cent reduction in the incidence of caries.

Arnold, Dean and Singleton[37] experimented with a single topical application of sodium fluoride solution containing 5,000 p.p.m. of fluorine on the teeth of 258 cadets at the U. S. Coast Guard Academy. A sodium chloride solution of equivalent concentration was applied to the teeth of a similar group of cadets as controls. At the end of one year, the control and treated groups had about the same number of new carious teeth, averaging 0.62 and 0.68, respectively. Clinical and roentgenographic examinations showed that in fifty-nine cadets having high counts (40,000 and above) at the start of the study three times as many new carious surfaces had developed as compared with fifty-five cadets with negative or low counts (less than 1,000), averaging 2.8 and 1.1, respectively. The L. acidophilus counts did not change during the year of study.

McClure[56] stated that the occurrence of fluorine in edible foods is widespread and rather variable. Different foods have different concentrations of fluorine, and the same foods may vary greatly in fluorine concentration, depending generally on the quantity of fluorine present in the surrounding soil and water. Ordinary foods do not have fluorine present in significant quantities. McClure stated: "With the exception of teas and fish foods, the quantities present do not compare with drinking waters which are associated with chronic endemic fluorosis." Data prepared by McClure showing the

52. Bibby, B. G., The Use of Fluorine in the Prevention of Dental Caries. II. Effect of Sodium Fluoride Applications. *J.A.D.A.* 31:317 (March 1) 1944.

53. Cheyne, V. D., Human Dental Caries and Topically Applied Fluorine: A Preliminary Report. *J.A.D.A.* 29:804 (May) 1942.

54. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 58:1701 (November 19) 1943.

55. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. II. Report of Findings for Second Study Year. *Pub. Health Rep.* 60:1085 (September 14) 1945.

56. McClure, F. J., Fluorides in Food and Drinking Water. Washington: U. S. Government Printing Office, 1939.

Table 4.—Concentrations of fluorine in various foods (data taken from McClure[56])

Food	Fluorine (p.p.m.)	Reference
Milk	0.07- 0.22	Phillips, Hart, Bohstedt[1]
Egg white	.20- .30	Phillips, Halpin, Hart[2]
Egg yolk	.80- 1.20	Phillips, Halpin, Hart[2]
Potatoes	∠.20	Churchill, Bridges, Rowley[3]
Wheat	∠1.00	Churchill, Bridges, Rowley[3]
Wheat	.30- 1.00	Hart, Phillips, Bohstedt[4]
Crushed oats	∠.20	Churchill, Bridges, Rowley[3]
Oats	.70- 1.70	Hart, Phillips, Bohstedt[4]
Corn	∠.20	Churchill, Bridges, Rowley[3]
Rice	∠1.00	Churchill, Bridges, Rowley[3]
Tomatoes (dry substance)	.60- .90	Dahle[5]
Lettuce (dry substance)	.60- .80	Dahle[5]
Carrots (dry substance)	∠.20	Churchill, Bridges, Rowley[3]
Turnips (dry substance)	∠.20	Churchill, Bridges, Rowley[3]
Apples (whole)	.80	Shuey[6]
Spinach (dry substance)	6.30- 8.60	Winter, Butler[7]
Beef	∠.20	Churchill, Bridges, Rowley[3]
Mutton	∠.20	Churchill, Bridges, Rowley[3]
Pork	∠.20	Churchill, Bridges, Rowley[3]
Canned corn	∠.20	Churchill, Bridges, Rowley[3]
Dried beans	∠.20	Churchill, Bridges, Rowley[3]
Fish foods	1.50- 12.50	Tolman[8]
Fish foods	3.90- 7.30	Churchill, Bridges, Rowley[3]
Teas	13.10-178.80	Reid[9]
Teas	41.0- 67.0	Churchill, Bridges, Rowley[3]

1. Phillips, P. H.; Hart, E. B., and Bohstedt, G., The Influence of Fluorine Ingestion upon the Nutritional Qualities of Milk. *J. Biol. Chem.* 103:123, 1934.
2. Phillips, P. H.; Halpin, J. G., and Hart, E. B., *J. Dairy Sci.* 17:693, 1934.
3. Churchill, H. V.; Bridges, R. W., and Rowley, R. J., Interference of Phosphorus in the Determination of Fluorine. *Ind. & Eng. Chem., Analytical Ed.*, 9:222, 1937.
4. Hart, E. B.; Phillips, P. H.; and Bohstedt, G., Relation of Soil Fertilization with Superphosphates and Rock Phosphate to Fluorine Content of Plants and Drainage Waters. *Am. J. Pub. Health* 24:936, 1934.
5. Dahle, D., *J. A. Official Agr. Chem.* 19:228, 1936.
6. Marcovitch, S.; Shuey, G. A., and Stanley, W. W., *Tennessee Agr. Exper. Station Bulletin* 162, 1937.
7. Winter, O. B., and Butler, W., *J. A. Official Agr. Chem.* 16:103, 1933.
8. Tolman, L. M, Paper read before meeting of American Chemical Society, April 1937.
9. Reid, E., The Fluorine Content of Some Chinese Food Materials. *Chinese J. Physiol.* 10:259, 1936.

concentrations of fluorine in various foods are shown in Table 4.

Cheyne and Rice,[57] testing the effectiveness of locally applied fluoride, reported data on the absorption of fluorine which indicate that caries activity was suppressed in existing lesions and that the development of new lesions was retarded in deciduous cuspids and molars.

Long-Range Experiments

Cognizant of the benefits which may accrue from the fluorination of water supplies, two neighboring cities in New York State, Kingston and Newburg, have agreed on a unique long-range experiment to determine the effect of fluorine as a preventive of dental caries among school children. The two cities are situated on the Hudson River thirty miles apart, and each has a population of approximately 30,000. The two population groups are rather similar in racial characteristics and economic status. Newburg's water supply is being maintained at 1.0 p.p.m. fluorine, while Kingston's water supply will continue to be fluorine free. One thousand school children from

57. Cheyne, V. D., and Rice, T. B., Effects of Topically Applied Fluorine on Human Dental Caries, Including a Method for Its Application. *J. D. Res.* 21:320 (June) 1942.

each city are being studied in the experiment. Bacterial examinations for L. acidophilus in the saliva of the children under study are to be made periodically. The experiment is planned on the premise that fluorine, in order to be effective, must be ingested during the years of tooth formation and that the individual must be continuously exposed to the fluorinated water during the period of study. Ten years after the start of the experiment, an evaluation of the results will be made.

Two other cities are cooperating in a similar experiment. Grand Rapids, Mich., has added 1.0 p.p.m. fluorine to its present fluorine-free water supply. Thirty-five thousand children were examined prior to introduction of the sodium fluoride into the water. Five thousand children in Muskegon, Mich., drinking fluorine-free water will serve as a control group. A L. acidophilus study also is being made as a part of this experiment.

Discussion

The changing of a source of water supply to one with a lower fluorine concentration for the prevention of one dental defect (mottled enamel) and the addition of fluorine to a communal water supply for the prevention of another dental defect (dental caries) is a most curious reversal. Whether the influence of fluorine is helpful or harmful depends on the amount ingested.

If fluorine is the effective agent in natural waters, it seems that the simplest and most direct approach in the reduction of dental caries with fluorine is to increase the fluorine content of the water supply to the same concentration as that of the threshold amount for mottling (1 p.p.m. of fluoride).

The use of fluorine, whether through fortification of public drinking water, through food or through the topical application of sodium fluoride to tooth surfaces, has provided public health officials and the dental profession with two possible methods to combat caries.

The possibility of controlling dental caries with fluorine therapy has made such an impression on the imagination and thinking of lay and professional people that conclusions may be drawn and practices adopted on the basis of unsubstantiated evidence. Many studies to test the validity of fluorine therapy may be started without proper controls and may lead to unscientific reports.

Much evidence has been presented in support of the fluorine-dental caries hypothesis. The results of many investigations have shown definitely that persons who have lived during their entire lives in areas of fluoride-bearing drinking waters (1.0 p.p.m. or more) experienced two to three times less cavities than persons who ingested fluorine-free waters. Experimental studies of the topical application of sodium fluoride to the surfaces of children's teeth have indicated the possibility of this technic as a satisfactory method of reducing the incidence of caries in areas of fluorine-free waters. Topical application, if permanently effective, would afford protection to teeth already developed, thus benefiting those children who do not use a communal water supply.

With the fluorination of communal water supplies, a large segment of the child population could benefit, provided children ingested the fluorinated waters during the first eight or ten years of their lives, the period during which the calcification of the enamel of all of the permanent teeth is completed, except the third molars. Even if all public water supplies were adjusted to contain 1 p.p.m. of fluorine, it has been estimated that only the two-thirds of the population to whom such supplies would be available would be benefited. For the other one-third, the topical application of fluoride would be an important substitute. The addition of fluorine to the communal water supplies not only may affect more persons, but

also may prove much less costly and more easily accomplished than any program of individual treatment.

The numerous experiments on animals have demonstrated an inverse relation between the ingestion of sodium fluoride and the incidence of dental caries. Other demonstrations have shown that enamel of carious teeth contains less fluorine than enamel in noncarious teeth. Investigators have determined that there is a direct correlation between fluorine content of molar teeth of experimental animals and the amount of fluorine added to the diet.

It has been shown that the L. acidophilus counts vary inversely to the intake of natural fluorine-bearing waters. Although excessive fluorine concentrations may produce toxic effects on the teeth (mottled enamel), the ingestion of the threshold amount for mottling produces no ill effects. Reports also disclose that fluorine is absorbed by the enamel surfaces.

All the beneficial results attributed to fluorine in drinking water may not be entirely the result of the ingested fluorine waters. The question has been raised that factors other than the fluorine content of water may supply the inhibitory influence in the reduction of the incidence of dental caries. The possibility has been suggested that, if fluorine is the inhibitory agent, it must be present in some particular combination of elements as yet not determined.

It must be realized that fluorine is not a complete caries preventive, but, on the basis of the results already achieved and indications from other experiments now in progress, it seems not unreasonable to expect that the incidence of dental caries may be reduced substantially.

Conclusions

1. It has been demonstrated that persons who have ingested drinking water high in fluorine concentration, 1 p.p.m. or more, all of their lives experience a dental caries incidence two or three times less than that of persons who ingest fluorine-free waters.

2. Topical application of sodium fluoride to young teeth in fluorine-free areas has resulted in as high as a 40 per cent reduction of the incidence of dental caries.

3. Topical application of sodium fluoride should prove beneficial in areas in which public drinking waters contain only a trace of fluorine.

4. Topical application of sodium fluoride should prove beneficial in populations which do not have access to a natural water supply containing an optimal concentration of fluorine.

5. The results of experiments on animals indicate the inverse relation between the incidence of dental caries and the ingestion of food and water containing optimal amounts of fluorine.

6. It has been demonstrated that there is a close correlation between the L. acidophilus counts and the incidence of dental caries and that the L. acidophilus counts vary inversely to the ingestion of fluorine-bearing waters.

7. It is possible that some factor or factors other than fluorine in natural drinking water may be implicated in the inhibitory influence on dental caries.

8. The threshold amount for mottling has been determined to be one part of fluoride per million parts of water.

9. The reduction of dental caries by ingestion of an optimal amount of fluorine in drinking water is accomplished only if the ingestion of the fluorinated water takes place during the calcification of the teeth (during the first eight or ten years of life).

10. It has not been demonstrated that ingestion of and exposure to fluorine-bearing drinking water has any effect on the teeth after calcification is completed.

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DIFFERENTIAL DIAGNOSIS OF PAIN IN RELATION TO ORAL SURGERY

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IN THE PAST, if one had asked what main symptom caused a patient to seek a dentist or an oral surgeon, the answer undoubtedly would have been pain in the region of the teeth, jaws or face. That is not so today because recent scientific advances have proved that by far the majority of serious diseases of the teeth and jaws is not accompanied by local pain. When the word serious is used in relation to disease, it is intended to include not only the local effects and extent of disease, but also its systemic effects which can seriously involve practically every structure and function of the body.

At first thought, the statement that by far the majority of serious diseases of the teeth and jaws is not accompanied by local pain may appear startling; but most infections of the teeth and jaws are chronic in nature and chronic disease in any region of the body seldom causes pain. For example, large regions of the lungs may be destroyed by tuberculosis without manifestation of pain. No local pain is manifested in teeth or jaws, in the vast majority of diseases of these structures, because the progress of the disease is slow. Thus, if the disease progresses slowly enough, a large part or practically all of the jaw may be destroyed by chronic disease unattended by symptoms of pain.

There is a far greater incidence of chronic local disease in the region of the teeth and jaws than elsewhere in the body because teeth, unlike other tissues of the body, lack the power to repair themselves after most types of bacterial or mechanical injury. If such irreparable injury occurs to any portion of the root of a tooth, that portion dies and must be considered an infected foreign body and a focus of infection. Elsewhere in the body nature would slough off dead tissue, but this procedure is impossible with the dead portion of the root of a tooth. Hence, the dead portion of the root, acting as an infected foreign body, causes continuous irritation, infection and injury to adjacent healthy tissues, especially the bony tissues. The result is innumerable types of infective and degenerative changes in the immediate region as well as effects of focal infection in all other tissues of the body, owing to the continuous absorption of bacteria and toxins into the blood stream. Added to these and other chronic local diseases of the mouth, there are the acute local diseases and the oral manifestations of a large number of systemic diseases. Thus the mouth may be considered the site of more disease conditions than can be found in any other region of the body.

In substantiation of my belief that most serious diseases of the teeth and jaws are not accompanied by pain, I estimate that, for every patient seeking relief from local pain, the average oral surgeon sees 25 patients without pain who present themselves for operations to eliminate various chronic diseases or for the diagnosis of chronic disease that may be the cause of systemic disorder. Increasing numbers of patients are learning that it is wiser to prevent disease, or eliminate[1]

1. Thomas, E. H., Mouth Infection and Industrial Health; A Mouth Health Program for Industry. *Indust. Med.* 13:900 (November) 1944.

it at its inception, than to wait until extensive or irreparable local or systemic damage has resulted.

The fact that chronic disease seldom causes pain must be kept in mind in all differential diagnoses of disease of the teeth and jaws. Yet the fact that pain is a symptom does not necessarily rule out the presence of chronic disease. In any chronic infection, if the resistance of the body becomes lower than normal, if the bacteria become more virulent, or if the infective drainage from the site of a chronic disease is suddenly interfered with, the result very likely will be an acute exacerbation of the chronic infection and this condition, of course, is usually accompanied by pain.

Kinds and Course of Pain

When a patient complains of pain, the terms he uses in describing that pain are a valuable aid in differential diagnosis. Consideration of a few of these terms and their significance may be helpful.

A pain described by the patient as sticking, knifelike, cutting, darting, lancinating, stabbing, shooting, sharp or like an electric shock ordinarily will indicate a possible irritation of the larger nerves of the jaws by some disturbance in close contact with them, usually acute infection. Probable causes are acute alveolar abscesses around the apexes of teeth that are close to large nerves, such as the lower third molars and lower bicuspids.

Pain described as scalding, burning, drawing or pulling also indicates irritation of large nerves but it is not associated so often with acute infections as with some mechanical disturbance of the nerves or the blood supply to their adjacent tissues. Examples are the burning, scalding pain in the tongue, caused by a closed bite; the burning pain in the lip or palate, owing to pressure of dentures, and the drawing, pulling pain caused by the contraction of scar tissue on a nerve after an operation or after healing of a region where tissue has been destroyed by infection. Contraction of scar tissue also can cause sensations of electric shock. The cause may be located far back along the nerve trunk, but the pain is felt in the ends of the nerve fibers. This is said to be a result of the fact that these nerve fibers are found on the periphery of the nerve trunk and, therefore, are the first to be affected by any adjoining irritation, just as they are the first to be affected by anesthesia after injection for nerve block.

Aching, boring, throbbing or jumping pain usually is associated with inflammation and acute infections in confined tissue that is incapable of expanding or swelling, such as the pulp of a tooth, the interior of the bones of the jaws or the unyielding periosteum. Examples of such inflammation are pulpitis, pericementitis, acute alveolar abscess, acute periostitis and osteomyelitis. Confined infection in its early stages may be accompanied by burning or cutting pain, and the movement of inflamed tissue may cause a cutting sensation. Bone will ache if it is exposed to oral secretions or to the toxins of decomposing blood clot.

Pain that is described by the patient as "sore" usually is associated with surface infections and acute injuries and infections of soft tissue. This kind of pain, however, may be caused by subacute pericementitis and confined bone infections in their later stages, when a sufficient quantity of calcium salts has been absorbed to allow expansion of blood vessels in the bone, or when confined infection has broken through the periosteum so that there is sufficient drainage to relieve exceptional pressure.

Usually of greater diagnostic value than the type of pain is the course of pain. This includes the kind of pain first suffered by the patient, its location, constancy or duration, and its change to a different kind of pain with different location, constancy or duration. The

process may go on indefinitely.

Also of great diagnostic value is knowledge of the time of day during which the pain is the greatest, the postures of the body that influence the pain and any other factors that cause it to vary.

It is a well known fact that sensitivity to heat or cold lasts only a few moments in a deep cavity of a tooth whose pulp is not inflamed. It is equally well known that, after pulpitis has developed, similar hot or cold applications cause pain that may last for several minutes or several hours. Probably the most striking diagnostic feature of a dead pulp is the intense pain which is induced by heat and which is entirely relieved in a matter of seconds by contact of the tooth with cold substances.

Other conditions, in which the pain varies and is thus of diagnostic significance, are: (1) most bone infections, which are most painful at night; (2) sinus infection, in which the pain increases when the patient bends forward, or is present when the patient awakens, but diminishes and stops by noon, and (3) pericementitis, in which biting against the tooth relieves the soreness.

Teeth should be given the electric test for pulp vitality before a positive diagnosis of dead pulp is made. Sensitivity of a tooth to heat and relief of the pain by application of cold substances are not positively diagnostic, because the teeth of some patients with slight traumatic occlusion react in the same manner. This condition is seen so frequently that one is apt to think first of traumatic occlusion when encountering these symptoms.

Traumatic Occlusion

Diagnosis of traumatic occlusion may be based on visible movement of a tooth, sufficient mobility of a tooth to cause blanching of the investing gum tissue or its movement against a finger pressed to it during occlusion. Marks by articulation paper will seldom indicate which teeth are involved, because absorption of bone around the diseased teeth allows them to move to a position of normal occlusion with opposing teeth.

Referred pain, especially in the face and neck, plays a large part in diagnosing traumatic occlusion. A patient, asked to locate or trace the pain, should be instructed to use the tip of a finger, rather than the entire hand. When the finger tip traces the course of one or more branches of the fifth nerve, neuralgia of that nerve may be considered. If the finger tip traces a course at variance with that of the fifth nerve branches, traumatic occlusion is indicated. This is especially so if the finger tip passes from the ala of the nose around the mouth to the chin, or from one side of the face to the other or down into the neck. Pain over the malar bone and along the posterior border of the ramus is usually caused by traumatic occlusion. If the patient traces a course downward from the region of the mandibular joint, in front of or behind the ear, to the side of the neck, or if he has the impulse to grasp and stretch the skin of the neck in order to relieve tension, traumatic occlusion should immediately be suspected. A slight degree of traumatic occlusion can cause symptoms that will place the patient under great mental and nervous tension. I have seen many patients who for months had placed large wads of cotton between their teeth before retiring, in order to control the pain of traumatic occlusion.

Aside from that caused by traumatic occlusion, most pain manifested on both sides of the face is caused by systemic disease.

A patient who traces an entirely different course each time he is asked to indicate the area of pain, may be suffering from neurasthenia.

Indication for Operation

One of the basic principles of practice holds that no operation should be per-

formed if definite indications for the procedure are lacking. Request by a patient for removal of a painful tooth does not justify its extraction. Because the pain may be referred, the wrong tooth may be removed. If the pain persists, the dentist may remove another tooth; and the procedure may be repeated until the patient is edentulous but still complaining of pain in some indefinite region deep in the bone.

The dentist would be justified in removing a tooth with generalized calcific degeneration of the pulp, since this condition can be a cause of intense pain. He might also be justified in removing a tooth containing a pulp stone, but I have never found pulp stone to be the cause of neuralgia. Furthermore, most diagnoses of pulp stones are erroneous, the appearance in the roentgenograms being caused by the varying thickness of the tooth structure surrounding the pulp chamber.

Neuralgia

One must distinguish between ordinary neuralgia and tic douloureux (trifacial neuralgia). The true facial neuralgia combines pain with associated facial distortion. During an attack, the lips and one side of the face may be pulled far over to the affected side, the eyelids may be pulled shut or the whole head may be drawn down almost to the shoulder. The pain of true tic douloureux is usually brought on by touching, even lightly, some trigger zone, and it is often of unbearable intensity. It lasts only a few moments and there is no pain between attacks. In ordinary neuralgia the pain may last for minutes or hours and there is no associated movement of the muscles.

Almost all ordinary kinds of neuralgia have local causes which can be discovered and eliminated. In many cases, tic douloureux also has a local cause. Even the pain for which no cause can be found can be relieved by some procedure less radical than brain operation. One such procedure is injection of weak solutions of alcohol into trigger zones only. Some cases of neuralgia seem to be caused by a vicious cycle inherent in the nerve itself. One injection of procaine may stop the vicious cycle and end the neuralgia.

When determining which nerve is involved in neuralgia one must remember that when a patient's finger is tracing the course of the second division of the fifth nerve it is also indicating the approximate course of the posterior superior alveolar nerve. Likewise, while his finger is tracing the course of the mandibular division, it is also following the long buccal nerve. The posterior superior alveolar and the long buccal nerves are often the ones involved.

Some frequently overlooked causes of facial neuralgia are: pressure of a lower denture on the mental foramen or on the external oblique ridge; pressure of an upper denture on either the anterior or posterior palatine foramen; knifelike ridges caused by irregular absorption of bone after extraction of teeth; flabby hypertrophied fibrous ridges; impingement of scar tissue on nerve fibers at the site of some previous operation; flat contact points, which permit food to pack between the teeth; closed bites; traumatic occlusion; infections of the maxillary sinuses, and the pressure of the margins of ill-fitting dentures.

Causes of Pain

It is generally considered by the profession that the more intense the pain of facial neuralgia the more serious or the more pathologic the cause must be. Therefore, if the patient complains of severe neuralgic pain, the general practitioner rushes him to the specialist who is expected to find some portentous and obscure cause. The general practitioner overlooks the fact that some of the most intense neuralgic pains frequently are caused by the most trivial abnormalities. For example, a tiny cavity in a sensitive

tooth of a high-strung patient can cause an intense neuralgia over one entire side of the face. A flat contact point, permitting food to pack between the teeth and decompose, can cause extreme pain over one entire side of the head. A small deep cavity extending into the pulp can cause excruciating pain across the entire top of the head. There seems to be no limit to the kinds of pain that can be caused by slight traumatic occlusion affecting only one tooth.

One obscure cause of pain referred to the face, although the pain is sometimes localized in the tooth, is a cracked or split crown. There may be no cavity in the tooth, and it may be vital to test. The fact that the pain increases during mastication indicates a tooth as the cause. Cold or hot liquids may intensify the pain, and the resulting increase in pain lasts much longer than that of pulpitis. Such cases are sometimes exceedingly difficult to diagnose and the offending tooth may be difficult to locate.

From a diagnostic standpoint the course is more important than the kind of pain. This may be illustrated by comparing the pain of acute alveolar abscess with that of osteomyelitis. Early in both diseases the pain may be intense in or around one tooth. On the second and third days, the pain is progressively more intense in both diseases; but it remains localized if the cause is an abscess, or it involves the adjoining teeth if osteomyelitis is the cause. By the fourth day, pus from the abscess may break through the cortical layer of bone, thus relieving most of the pain and causing a marked swelling of the overlying soft tissues. In osteomyelitis, the pain has increased steadily, involving more teeth, and the soft tissues overlying all of these teeth have become edematous but there is no excessive swelling. Although there are exceptions, these differing symptoms are usually seen in the routine development of the two diseases.

A more detailed discussion of osteomyelitis of the bones of the face appears in a previous paper.[2]

The symptoms of pain sometimes manifested by a dying pulp are generally familiar. The initial pain is diffuse and extends over one entire side of the head. During the next three or four days, the pain recedes to the side of the face, thence to the side of the jaw, to possibly three teeth, and finally localizes in the affected tooth.

Although this discussion has been limited to the subject of pain, in the diagnosis of most of the obscure diseases of the jaws and face, every sign and symptom of abnormality must be taken into consideration. One must, of course, begin with the first indication of trouble and include in one's consideration the entire course of these abnormal conditions.

Taking the History

Probably the most important and most difficult art to be studied and mastered by the diagnostician is the obtaining of a competent history. If a competent history is obtained by one who has a thorough knowledge of clinical oral pathology, it will enable him to diagnose a large proportion of ailments before actually examining the patient.

In evaluating pain one must, of course, take into consideration the threshold of pain, which is the dividing line between what the patient will call a sensation of some kind and what he will term actual pain. For example, if one presses a knuckle lightly against some sensitive part of the body it will be felt as pressure. If one increases the pressure, it will finally cause what will be called pain. This threshold of pain is at a different level for the same patient at different times and it is, of course, at a different level for different patients. In diagnosing many condi-

2. Thomas, E. H., Osteomyelitis of the Bones of the Face: Diagnosis and Treatment. *J.A.D.A.* 20:614 (April) 1933.

tions it is important to know whether the threshold of pain is high or low. A thorough diagnostician knows by experience about where the patient's level is in relation to the average; but one can ascertain easily by pressing a blunt instrument against the tissues with enough force to cause what would be considered slight pain by the average patient. If the force causes the patient no pain, his threshold is high. If it causes extreme pain, his threshold is low. If the threshold is low, one should discount to a considerable degree any statements regarding the intensity of pain of which the patient complains.

The neurasthenic patient actually does feel pain, although it is usually considered that his complaints are of mental rather than physical origin. In some cases of suspected neurasthenia, however, there is a cause for the pain, and calling these patients neurasthenics is really an admission of incompetency in diagnosis.

The malingerer is one who, for some ulterior motive, complains of symptoms which he does not have. In many cases he is suing a doctor for malpractice or trying to collect damages from an insurance company. A majority of these patients can be trapped during an examination by comparison of their responses with normal responses to various procedures. For instance, their "pain" seldom will follow normal anatomic nerve distribution. One must be cautious, however, since the normal distribution may vary to some extent.

Further examples of referred pain are given in the following case histories.

1. A man with an edentulous mouth complained of practically unbearable pressure pain in the top of his head over a period of four days. The patient felt as if a large pointed object were pressing down into his brain. There were no local symptoms in the mouth, but roentgenograms revealed a small cyst in the lower right bicuspid region. When the cyst was opened, pus spurted out. A few seconds later the pain in the top of the head was gone completely.

2. Trouble developing postoperatively in a lower molar socket in many instances will cause no local pain but will manifest as an intense earache. Such symptoms can be caused also by upper teeth. For example, a woman had an upper second molar removed under local anesthesia. While the apical region of the tooth was being detached from its adjoining tissue there was no pain in the region of the tooth, but in the ear on the same side there was excruciating pain.

3. A woman, whose complaint was extreme throbbing pain in the back of the neck, had traumatic occlusion of the left cuspids. While the lower cuspid was being ground to adjust the occlusion the patient felt as though the grinding were taking place in the back of her neck. Adjusting the occlusion did not cure the symptom, which was caused by arthritis of the neck, but it was interesting to learn about the reflex nerve connection.

Identical symptoms of another patient were relieved entirely by the removal of an upper lateral incisor which was involved extensively by chronic gum infection. There had been no pain around the tooth.

4. A patient having severe pain in the lower left lateral incisor was relieved of her pain by adjustment of the occlusion of the lower left second molar. Evidently the traumatic occlusion caused the molar to change its position slightly and the occluding molar forced it forward. Consequently, all of the other lower teeth were moved forward. The lateral incisor was the only one whose movement was in a direction that caused pain, possibly because of the fact that it was being rotated by the pressure.

Impacted Teeth and Focal Infection

Impacted teeth are frequently overlooked as a cause of severe headaches. In my opinion, all impacted teeth should be

removed unless they can be brought into their normal position.

In addition to pain about the head there are several types of mental disturbances which are caused reflexly by impacted teeth or other pathologic conditions of the jaws. Also there are dizziness and painless symptoms in the ear which are caused by infection in the mouth.

Pain in the eye may be the result of involvement from focal infection around the teeth. The most frequent disease is iritis, and in a large proportion of such cases the focus is infection in the mouth. Such infection also has a relation to the healing of corneal ulcers. It must be remembered that infection in the mouth includes pulpless teeth that are roentgenographically negative, as well as even the most minute regions of infection of the gingiva.

Referred pain and other reflex nerve disturbances caused by disease conditions in the mouth are by no means limited to the head and neck. Almost any part of the body may be affected. Pain in the arm over a period of many years was entirely relieved in one day by removing the patient's impacted upper cuspid. Dysmenorrhea (painful menstruation) is often eased to a great extent, and sometimes entirely cured, by the removal of impacted teeth. Projectile vomiting, that occurred every five minutes for two days out of every ten, and had continued for two years, was stopped entirely by removing two of the patient's impacted upper teeth.

In addition to pain that is caused in other parts of the body by reflex nerve disturbances there is pain which is the result of focal infection in the mouth. Disease conditions almost anywhere in the body, with accompanying pain, can be caused by focal infection of the teeth and jaws. This infection, if chronic, may cause no local symptoms. Because, in all of these instances, there are no local symptoms, many dentists and physicians overlook a large proportion of chronic infections in the mouth, and many even fail to appreciate the serious significance of that chronic infection which does come to their attention. Both professions, and especially the dental profession, have a serious responsibility in this regard. Incidentally, it should be emphasized that a proper diagnosis cannot be made from roentgenograms alone. These subjects have been discussed in more detail in previous papers.[1, 3, 4]

Vicious Cycles

Vicious cycles, arising from inconsequential sensations in the mouth, frequently lead to extremely painful symptoms. For example, a patient discovers with his tongue an irregular surface on a tooth. He continues to investigate it, and soon, from constant rubbing, the tongue becomes inflamed and sore. He then continues touching the same spot with his tongue to see if the soreness is increasing or diminishing, and the tongue naturally becomes worse. Finally, because of lowered resistance of the inflamed tongue, mouth bacteria are able to make inroads and a large painful ulcer is the result.

Similarly, a patient feels a peculiar sensation in his palate, presses the palate with his finger and feels, under the tissue, the sharp hamular process of the palate bone. He wonders if there is something wrong and continues to feel and press against it until the bone cuts into the overlying tissues which become inflamed. Repetition of this procedure results in a serious condition.

Frequently one sees a patient who formerly complained of slight soreness in some region in the mouth and went to a dentist who aggravated the condition by cauterizing the region. A second

3. Thomas, E. H., Mouth Infection in Industrial Workers; A Serious Menace to General Health; Resultant Loss to War Production. *J.A.D.A.* 30:1249 (August) 1943.

4. Thomas, E. H., Use and Abuse of Radiographs in the Diagnosis of Mouth Infection. *Indust. Med.* 15:1 (January) 1946.

cauterization over a larger region made the condition still worse. The patient changed dentists, a strong mouthwash was prescribed, and the condition, now extremely painful, spread over a larger region. He then changed dentists repeatedly and consulted one or two physicians each of whom prescribed a more powerful mouthwash, with the result that practically no epithelial tissue was left in the patient's mouth. The treatment in such a case, obviously, is to keep every irritant from the mouth, even food so far as possible, for a few days. Obviously there are situations in which overtreatment is worse than no treatment at all.

Another vicious cycle begins when progressive bone absorption allows the margin of a denture to cut into the tissues even to the extent of 1 mm. This causes slight soreness and inflammation which thickens the soft tissue, inducing the margin of the denture to cut deeper. This in turn creates pain and increased inflammation, resulting in swelling which causes the denture to cut in still deeper, to the extent that the appearance would indicate that the margin of the denture should be trimmed possibly 10 mm. instead of the 1 mm. that is actually required.

Superimposed Pain

There is another problem of pain in relation to diagnosis. Often there may be present, simultaneously, two or more pathologic conditions affecting the mouth, teeth or jaws. The pain of one condition may overshadow the pain of a more serious lesion, thereby causing the more serious one to be overlooked. An example is the patient with Vincent's infection, superimposed on cancer or gumma, who is treated for weeks before the complete diagnosis is made. Another example is pulpitis in a lower second molar, which is overlooked because there is an accompanying acute infection of the throat and cheek around an impacted lower third molar.

Hints on Diagnosis

Pain indicated by pressure of the patient's finger as being in a gland in the neck may instead be in the cervical vertebrae.

Pain and soreness along the anterior border of the ramus of the mandible are usually caused by gingival infection around the lower second or third molar.

Swelling and pain in the soft tissue buccal to the lower first molar are often caused by subperiosteal extension of infection from a lower third molar.

Acute infections causing soreness of the gums, cheeks and other soft tissues of the mouth may stem from local infection superimposed on manifestations in the mouth of any one of numerous systemic diseases. Most common are vitamin deficiencies, metal or drug poisonings, diabetes, blood dyscrasias and menopausal disturbances in ovarian secretion. In 1916 I listed over seventy-five such diseases and today a great many others could be added.[5]

Swelling and pain over the temple are more likely to be caused by infection from lower than from upper molars. Extension of the pain over the side of the head makes this diagnosis more definite. The route of the infection is along the fascia of the temporal muscle but the ingress occurs where this muscle is attached to the anterior border of the ramus of the mandible.

A burning pain on the side of the tongue or a metallic taste in the mouth is most often caused by a closed bite although the former can be caused by systemic toxins and the latter by electrolysis.

A burning pain on the inside of the lower lip is often caused by the exertion of great pressure on the posterior ends of a lower denture.

Inflammations in the upper third molar region often cause referred aching

5. Thomas, E. H., Is the Cause of So-Called Pyorrhea Alveolaris Constitutional? *D. Review* 31:193 (March) 1917.

pain in the lower bicuspids on the same side.

Neuralgic pain in the lower jaw or ear after removal of an impacted lower third molar is not necessarily caused by infection in the socket. It may be the result of pressure against the nerve by the bony roof of the inferior dental canal which has been bent downward by the third molar. Temporary paralysis of the nerve with associated numbness of the lip can be caused in the same way.

In patients wearing full dentures, closed bites are the cause of many cases of facial neuralgia.

A painful lateral abscess adjacent to the root of a tooth with a vital pulp can be caused by a so-called pyorrhea pocket, the width of which may be only that of a fine explorer. Even an extremely narrow pocket can extend to the apical region and cause apical bone destruction.

Pain in upper bicuspid and molar teeth can be caused by acute infection of the maxillary sinuses.

It is hoped that these comments on pain in relation to oral surgery will be an aid in the differential diagnosis of diseases of the mouth, and a stimulus to more alertness to the differences in pain described by the patient. This increased alertness in observation should be reflected in more accurate differential diagnosis.—*55 East Washington Street.*

DIRECT METHOD OF FORMING TANTALUM FOR REPAIR OF SKULL DEFECTS

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During the war, many skull defects were repaired by the dental and neurosurgical services of Lawson General Hospital, Atlanta, Ga. The dental service, by virtue of the nature of its training, received the patient, a part of whose skull had been destroyed, and prepared a skull plate of metal for insertion by members of the neurosurgical staff. It is the object of this paper to present the procedures involved in the first half of the process of cranioplasty.

The material used in making skull plates is tantalum, a metal with a characteristic bluish-gray color and a luster similar to that of platinum. The metal, in powder form, is purified, rolled and pressed into the desired shapes. Since the melting point is 2996 C., it is extremely impractical to subject the metal to smelting. The density of tantalum is 16.6 or about twice that of steel. However, it is ductile, workable and readily machined, in which respects it may be compared favorably with stainless steel. Tantalum is well tolerated by the tissues because it permits cells to attain their normal development unhampered. Normal bone growth around the tantalum plate has been reported, and it is claimed that there is evidence of the attachment of fibroblasts to the plate itself.

Clinical Procedure

Before reporting to the dental clinic the patient is instructed to have his head

shaved around the skull defect and to have lateral and anteroposterior roentgenograms made of his skull so that the operator may determine more accurately the extent of bone loss. It is often advisable to have a view perpendicular to the plane of the defect as an aid in estimating its size.

The patient is seated in the dental chair, his defect parallel to the floor, for reasons that become apparent later, and the dentist determines the extent of the bone loss by palpation and reference to the roentgenograms. With a skin pencil a line is drawn on the solid bone around the defect 1 cm. from the edge of the bone. This is the outline that is to determine the extent of the skull plate. This outline is transferred to a sheet of transparent cellulose acetate, obtained by washing x-ray film in hot water, by placing the sheet over the area and tracing the lines previously drawn on the head. The name of the patient is written on the sheet so that it may be determined on which side the tracing was made.

Either modeling or potter's clay is added to the defect (Fig. 1) which is filled in flush with the margin of the defect, after the direct method originated by Holtzendorff.[1] Potter's clay is preferred because it can be mixed to the consistency desired by the operator. More or less clay may be used as the correct contouring of the skull dictates. The clay should not be extended over the margins of the defect, for this produces an inaccurate impression which is transferred to the plate on pressing. In my opinion, this direct method is much more accurate than those in which impressions of the skull are taken, including the defect, and the plate is built to the corrected model poured in the impression material.

After the defect has been filled in and brought to the proper smooth contour, a covering of two layers of transparent fingernail polish is applied over the contoured clay to seal the margins of clay and scalp as well as to give the subsequent impression a smoother finish. Over the dried nail polish the outline is again traced with a skin pencil so that it will transfer to the impression.

The impression is taken in the artificial stone used for pouring dental models. The stone is mixed to a consistency similar to that used in pouring impressions of regions in the mouth. The patient is seated in the chair so that the plane of the defect is in a horizontal position and the stone is applied to cover the clay restoration of the defect as well as an area of at least one inch outside the periphery of the outline. The reason for maintaining the horizontal plane of the defect now becomes apparent, as any deviation from this position tends to displace the artificial stone by the pull of gravity. The stone is allowed to set and pass through the stage in which heat is given off. Then, by gentle prying at the edges, the impression is removed and examined for reproduction of the outline. If the outline is not clearly reproduced the operator should invert the cellulose acetate tracing and place it in the impression to trace the correct and strengthened outline. There is now a negative reproduction of the desired contour. The impression is allowed to set for at least three hours before further procedures are undertaken.

Laboratory Procedure

A large mix of stone is prepared and placed in a round steel flask. The impression is soaked in water for thirty minutes and placed directly in the center of the mix. The soft stone is formed to the outer margins of the impression so that all surfaces lead down to the impression. This mix is allowed to harden for at least three hours. The flask has a hole in the bottom so that the stony mass may be ejected on completion of the case.

While the stone is setting, the tantalum

1. Holtzendorff, L. C., A Method of Forming Tantalum Plate for Cranioplasty. *Bull. U.S. Army Med. Dept.* 4:593 (November) 1945.

Fig. 1.—Left lateral views of patient, showing outline of defect, clay being added to rebuild profile and completed profile ready for stone impression

is cut to the desired shape with a pair of tin snips, following the outline traced on the cellulose acetate. After the stone has set, the tantalum plate is placed on the impression and fastened with adhesive tape so that during pressing the tantalum will be guided to the edges of the corresponding outline in the impression.

The flasked impression with the attached tantalum is now placed in a steel cylinder which is closed at the bottom and of slightly larger circumference than the flask. The cylinder is open at the top to receive a rubber pad (of 40 durometer hardness) about four inches thick, which conducts and distributes the force exerted by the hydraulic press capable of ten tons of pressure (Fig. 2). This rubber pad, on pressure, conforms to the surface of the impression, thus forming the tantalum as well. In cases of great concavity of the impression, smaller auxiliary rubber pads are used to direct the force more precisely to areas of greater concavity. After a maximum of force has been applied for about three minutes, the contents of the steel cylinder are ejected.

At this point, the auxiliary pads may be rearranged at points where they are most needed, and the process of pressing is repeated. Wrinkling of the edges of the tantalum plate will be noted. This may be eliminated without damage to the impression by hand swaging against the impression with a lead hammer. In cases of extreme and extensive contouring, wrinkles of such magnitude develop that they cannot be swaged or burnished out. In these cases it is necessary to cut V-shaped pieces from the plate to allow for its decrease in circumference on forming to the impression.

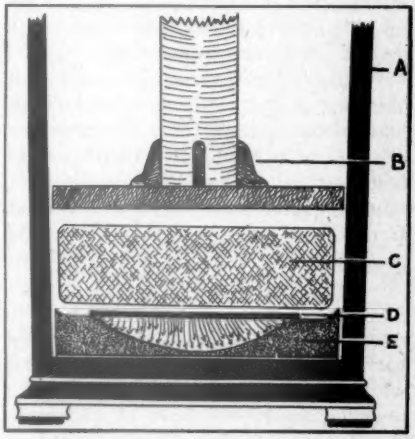

Fig. 2.—Diagrammatic cross section of hydraulic press: A, steel cylinder; B, plunger of hydraulic press; C, rubber plunger pad; D, tantalum plate (.015 in. thickness), and E, steel flask containing stone impression

Fig. 3.—Appearance of patient before insertion of tantalum skull plate

The plate is now polished. Sharp edges or spines are removed with a dental carborundum stone, pumice and a rubber wheel. It is not necessary to give the plate a high luster, for this is removed by autoclaving before insertion.

The patient is recalled and the plate is placed over the defect so that the dentist may observe any discrepancies which might have appeared. Simple corrections may be made with contouring pliers, by adding pink baseplate wax to the impression or by scraping the impression in desired places and re-pressing it.

With a tapering crosscut fissure bur, holes are drilled in the periphery of the plate about 3 mm. from the edge and about ¾ in. to 1 in. apart. Through these holes and into holes drilled in the skull, tantalum sutures are placed and secured. If tantalum screws are to be used, the neurosurgeon should designate spots on the plate through which they are to go. With a tapering crosscut fissure bur, each hole is made large enough for the barrel of the screw and is countersunk with a large round bur to fit the beveled undersurface of the head of the screw. Some surgeons prefer holes drilled at intervals over the entire plate, honeycombing and lightening it to allow the interchange of tissue fluids.

The plate, now ready for insertion, is adapted easily at the operating table to compensate for discrepancies in the impression which were caused by overlying musculature.

Report of Case

History.—The patient reported to the dental clinic for a skull plate to replace an extensive amount of lost bone.

This infantryman had been wounded in the forehead by a sniper's bullet which had removed a segment of the frontal bone in the center of the forehead approximately two inches wide and four inches long.

Examination.—It was found that the bone had become infected, necessitating the removal of the remainder of the frontal bone including the frontal sinus, the supra-orbital ridges and walls, a portion of the lacrimal bone, the superior one-third of the nasal bones and a portion of the frontal processes of both maxillae. When the patient reported to the dental clinic, that portion of his scalp previously covering the lost bones had sagged and was resting on the superior surface of his ocular globes (Fig. 3).

In spite of the injuries and incidental damage to the brain, the patient's sight was normal, his conversation was intelligent and his speech unimpaired. The most prominent manifestation of his injury was difficulty in walking.

Treatment.—The routine procedure in this case was complicated by the absence of bone

Fig. 4.—Appearance of patient two weeks after insertion of tantalum skull plate

against which to build at the inferior border of the defect. This difficulty was overcome by building up the profile in potter's clay to include supra-orbital ridges and superior portions of the nasal bones. The impression was made to cover the entire defect, as well as the eyes with the lids closed. At the junction of the ocular globes and the defect an extension of tantalum was left to be shaped at the operating table to form a portion of the superior orbital wall.

After the first pressing it was found that the supra-orbital ridges were not going to be prominent enough to be apparent after insertion of the plate. To compensate for this, ridges of pink baseplate wax were added to the impression just superior to the indentations of the supra-orbital ridges. The plate was again placed in the impression and subjected to pressure. By this method the indentations above the supra-orbital ridges were deepened and the ridges accentuated.

In this particular case three skull plates were made before one was considered suitable to submit to the surgeon for insertion (Fig. 4).

Summary

A direct method for making tantalum skull plates has been presented.

The direct method has proved successful in more than two hundred cases at Lawson General Hospital.

The method originated by Holtzendorff is presented here with further modifications by the writer.

It is anticipated that these procedures will prove useful in prosthetic dentistry in the future.

DISTRIBUTION OF NEGRO DENTISTS IN THE UNITED STATES

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THE Division of Public Health and Preventive Medicine at Howard University has been engaged for several years in a study of the distribution of Negro professional personnel in the United States. The results of these investigations have appeared in three articles.[1-3] The distribution of Negro dentists in this country would naturally constitute an important facet of such a project, and therefore in the spring of 1945 such a study was undertaken. The methodology used, with certain minor modifications, was similar to that employed in the other studies and may be described briefly as follows:

1. The mailing list of the National Dental Association, a national organization of Negro dentists, was first obtained.

2. A list of Negro dentists who had filled out the questionnaires required by Procurement and Assignment Service during the latter part of 1941 and the early months of 1942 was also obtained. This list was nearly complete since it was mandatory that each dentist return the questionnaire properly filled out.

3. The two lists thus obtained were checked against each other by name and address in order to make additions and deletions and arrive at a single combined list.

4. This compilation subsequently was broken into individual lists for each state in which Negro dentists were to be found. These lists were sent either to the president of the constituent state dental society of the National Dental Association or to a prominent Negro dentist in the state who was asked to check the state list for completeness, taking into consideration deaths, recent additions and those dentists who had left the community to practice elsewhere.

5. The list from each state when returned was again checked, and the names of dentists for whom no information was given were culled and double post cards requesting the return of the post card were sent to each.

6. Thus, three lists were finally available; namely, the combined list already described, the checked individual state list and the list made up from returned post cards. By a combination of these three, it was possible to obtain a list which for practical purposes contained the names of all the Negro dentists in the country in 1945. The material thus obtained was analyzed in terms of the distribution of Negro dentists in relation to the Negro population in the various regions, states and cities in the United States. For comparative purposes the report from the Bureau of Census dealing with the distribution of Negro dentists in 1930 was consulted, and Joseph R. Houchins, specialist in Negro statistics, Bureau of Census, provided information on the distribution of Negro dentists in 1940.

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1. Cornely, P. B., A Study of Negro Nursing. *Pub. Health Nursing* 34:499 (August) 1942.

2. Cornely, P. B., Distribution of Negro Physicians in the United States in 1942. *J.A.M.A.* 124:846 (March 25) 1944.

3. Cornely, P. B., Distribution of Negro Physicians in Urban Communities with Less Than 50,000 Negroes in 1942. *J. Nat. M. A.* 37:81 (May) 1945.

Table 1.—Distribution of Negro dentists and Negro population and population per dentist according to major geographic divisions, 1930 and 1940

Region and division	Negro dentists		Percentage increase or decrease, 1930–1940		Population per dentist	
	1930	1940	Negro population	Negro dentists	1930	1940
United States	1,773	1,471	8.2	−17.0	6,707	8,745
Regions						
North	925	718	15.8	−22.4	2,605	3,886
South	798	709	5.8	−11.5	11,731	13,970
West	50	44	41.8	−12.0	2,407	3,880
North						
New England	60	49	7.9	−18.3	1,568	2,072
Middle Atlantic	414	330	20.5	−20.3	2,543	3,843
East North Central	346	267	14.9	−22.8	2,689	4,005
West North Central	105	72	5.8	−31.4	3,160	4,875
South						
South Atlantic	424	376	6.3	−11.3	10,428	12,497
East South Central	181	170	4.6	− 6.1	14,686	16,357
West South Central	193	163	6.3	−15.5	11,824	14,878
West						
Mountain	8	7	20.5	−12.5	3,778	5,202
Pacific	42	37	49.0	−11.9	2,146	3,630

It is believed that, although there are some inaccuracies, the analysis which follows represents as nearly as it can the distribution of Negro dentists in the United States for the year 1945. The figures include the dentists in the armed services. The number in the services, however, did not materially affect this study, since at the peak of strength on April 30, 1945, there were only 123 Negro dentists in the Army and Navy.[4] Thus the impact of war did not cause the dislocation in the body of Negro dentists which it did on the mass of their white colleagues.

Distribution by Subdivisions

The distribution of Negro dentists for the years 1930 and 1940 in the major geographic divisions in the United States is shown in Table 1. During this decade the number of Negro dentists decreased from 1,773 to 1,471, or 17 per cent. The Negro population during that period increased by approximately 8 per cent. Thus in 1940 there were less than 1,500 Negro dentists serving a Negro population of almost 13,000,000, or a ratio of 1 dentist to 8,745 persons. This decline in the number of Negro dentists is out of proportion with the slight decrease in the total number of dentists during this decade. In 1940 there was a total of 70,601 dentists in the United States as contrasted with 71,055 in 1930, a decline of 0.6 per cent.[5] The decline in the num-

4. Personal communication to the author from the Office of the Civilian Aide to the Secretary of War.

5. Morrey, L. W., Dental Personnel. *J.A.D.A.* 32: 131 (February 1) 1945.

Table 2.—Number of Negro graduates and students in dental schools in the United States, 1931-1939*

Year	Graduates	Students
1931	.....	155
1932	.....	131
1933	36	86
1934	17	68
1935	10	63
1936	18	69
1937	11	61
1938	10	77
1939	13	96

*Council on Dental Education, *Dental Students' Register*. Chicago: American Dental Association, 1939.

ber of Negro dentists is also out of proportion with the decline which occurred in the number of Negro physicians. Between 1932 and 1942 the percentage decrease in the number of Negro physicians was 4.6.[2]

The decrease in the number of Negro dentists between 1930 and 1940 may be explained to a great extent on the basis of what took place in the field of dental education for Negroes in this same period. Table 2 shows that the enrollment of Negro dental students decreased from 155 in 1931 to 96 in 1939, and the graduates decreased from 36 in 1933 to 13 in 1939, declines of 38.0 and 63.8, respectively. It has been stated that, as a result of death or retirement, there is an annual loss of 24 dentists per 1,000. If this obtains in the Negro dentist group, then during this decade annually from 35 to 45 dental practitioners were removed from active practice. When this number is compared with the number of Negro graduates yearly, it is seen that with the exception of 1933, when 36 Negro students finished their prescribed course, and possibly the two preceding years, there is no year when there is a sufficient number even for replacement, let alone for increase in the number of Negro dentists. On the other hand, the total number of dental graduates in the United States decreased from 1,842 in 1931 to 1,757 in 1940, a decline of 4.1 per cent.[6] Even with this decline, the total number of dental graduates was greater than the estimated number of those retiring and dying.

Table 1 indicates that the decrease in Negro dental personnel between 1930 and 1940 was general throughout the United States. The decrease was highest in the North, 22.4 per cent, and lowest in the South, 11.5 per cent. In the North the West North Central region, with a small Negro component, showed the greatest loss, and in the South the West South Central region showed the greatest decline. Thus it could be said that the West Central area of the United States, with almost 3,000,000 Negroes, suffered the greatest loss during this period. The West, made up of the Mountain and Pacific Divisions, although showing a tremendous increase in its Negro population, also participated in the decline of dental personnel to the extent of 12.0 per cent.

What has happened during the period between 1940 and 1945? An attempt is made to answer this question in Table 3. According to our investigation there were, in 1945, 1,533 Negro dentists, or an increase of 4.2 per cent over 1940. However, this total still does not equal the number in 1930. This increase was not shared by all the regions in the United States. The West continued to show a decline, but the North and South showed increases of 3.6 and 6.5 per cent, respectively. This was a gain of 46 dentists in the South and 26 in the North. All the regions in the North and South with the exception of the Middle Atlantic and the West South Central showed increases, and even among the

6. O'Rourke, J. T., and Miner, L. M. S., *Dental Education in the United States*. Philadelphia: W. B. Saunders Co., 1941, p. 308.

exceptions little decline is noted. It is of interest to note that, of all the nine divisions in the United States, the New England and Mountain sections are the only ones which in 1945 not only had reached the 1930 level but also had surpassed it. This is particularly true in the case of the New England region, which showed an increase of 36.7 during the five year period, the highest among all the divisions.

The increase during this five year period may be attributed to the changes which occurred in dental education. Beginning with 1940 there was an amelioration of economic conditions so that an increasing number of Negro students could apply to dental schools. In 1941 there was an increasing demand for medical and dental personnel in order to meet anticipated needs of World War II. Howard University and Meharry Medical College, which annually graduate 90 per cent of Negro dental students, began to increase the number of admissions. In 1942 the Army Specialized Training Program was put into effect, making it possible not only to increase further the number of admissions but also to accelerate the educational program so that classes could be graduated every nine months. Thus by 1944 some increase in the number of Negro dental graduates could be noted, and this high level of enrollment and graduation has been maintained. It is anticipated that with favorable economic conditions and the advantages of the G. I. Bill of Rights the high level in these two schools will continue. If the other thirty-eight dental schools are disposed to admit more than the usual number of Negro students, then a continued increase in the number of Negro dentists is to be expected. Even with these two possibilities the question still remains as to what additional program will have to be developed in order to train sufficient numbers of Negro dentists to care for the Negro population. The answer to this question must be given by dental educators and governmental health agencies.

The ratio of Negro dentists to the Negro population in 1940 was 1 to every 8,745 persons. This is approximately 4.7 times the ratio existing in the United States as a whole, for in 1940 there were 70,601 dentists serving approximately 132,000,000 persons, or a ratio of 1 dentist to 1,865 persons. It is interesting to note that this is almost the same disproportion that exists between the physician-population ratio in Negro and white groups.[2]

The disadvantageous situation of the Negro population is even more striking when the various regions are considered. The South, with over 75 per cent of the Negro population, has the most unfavor-

Table 3.—Distribution of Negro dentists and percentage increase or decrease between 1940 and 1945 according to major geographic divisions

Region and division	Negro dentists, 1945	Percentage increase or decrease, 1940-1945
United States	1,533	4.2
Regions		
North	744	3.6
South	755	6.5
West	34	−22.7
North		
New England	67	36.7
Middle Atlantic	327	− 0.9
East North Central	272	1.9
West North Central	78	8.3
South		
South Atlantic	415	10.4
East South Central	177	4.1
West South Central	163	....
West		
Mountain	9	28.6
Pacific	25	−32.4

able ratio, with 1 Negro dentist for every 13,970 colored persons. In this area the East South Central subdivision reaches the lowest level, with 16,357 Negroes for each Negro dentist. On the other hand, the most favorable proportions obtain in the New England and Pacific divisions, two areas with relatively small Negro populations. They have ratios of 1 to 2,072 and 1 to 3,630, respectively.

The comparison between regions is most vividly and strikingly brought home when it is noted that in 1940 the South, with almost 10,000,000 Negroes, had practically the same number of dentists as the North, with less than 3,000,000 Negroes. The ratio of Negro dentists to population in 1945 was not computed for region, divisions and state, since the increase in the number of Negro dentists over 1940 is small and accurate population figures are not available. It is believed that the ratio of Negro dentists to the population was approximately the same for 1945 and 1940.

Distribution by States

The conditions existing in the various states reflect what has already been noted for regions and larger subdivisions. In Table 4 comparisons are given for the states for the years 1930 and 1940 and for 1940 and 1945. It is seen that between 1930 and 1940 the decreases were shared by all the states except Connecticut, West Virginia, Tennessee and Oklahoma. Wisconsin, Virginia, Mississippi, Colorado and Arizona showed no change in the number of dentists, but, by virtue of increases in their population during this decade, the ratio of dentists to population had increased. In the Northern states the highest decline was shown by Rhode Island, with 40 per cent, and in the South by South Carolina, with 25.9 per cent. The changes in the Mountain and Pacific states, with the possible exception of California, were not particularly significant because of the small numbers of Negro dentists within each region. By and large, the majority of the Northern states showed declines of more than 20 per cent, and the South with the exception of South Carolina, Kentucky and Louisiana showed declines of less than 20 per cent. One would expect to find the reverse of this condition since the Northern states are richer than the Southern ones and there would be a tendency for the few dental graduates to gravitate annually northward and replace the older and the deceased dentists, thus averting a large decline. On the other hand, it is possible that all that we see here is a natural process caused by a higher mortality and retirement rate in the North as compared with the South.

When the periods of 1940 and 1945 are considered, it is noted that there is no particular pattern in the distribution of the increase in the number of Negro dentists during this period. In the North, seven out of sixteen states showed definite increases. In the South, excluding the District of Columbia, seven out of sixteen states also showed definite improvement. In the West, California continued to show a downward trend from 38 in 1930 to 35 in 1940 and 23 in 1945. The only division in which every state showed an increase was New England. In the North, the highest significant increase occurred in New Jersey, with 35.7 per cent, while in the South, again excluding the District of Columbia, North Carolina was first, with an increase of 27.1 per cent. The states which showed a decrease during this period did not show a large loss, most of the decreases being less than 10 per cent.

The ratio of dentists to population in the various states excluding the District of Columbia again presents a rather uniform pattern mirroring what has already been seen for the regions and subdivi-

Table 4.—Distribution of Negro dentists by states in 1930, 1940 and 1945

States	Dentists		Increase or decrease (%), 1930-1940		Population per dentist		Dentists, 1945	Increase or decrease (%), 1940-1945
	1930	1940	Pop.	Dentists	1930	1940		
New England								
Maine			19.0					
New Hampshire			−47.6					
Vermont			−32.4					
Massachusetts	42	30	5.8	−28.6	1,247	1,846	44	46.7
Rhode Island	5	3	11.2	−40.0	1,983	3,675	4	33.3
Connecticut	13	16	12.4	23.1	2,258	2,062	19	18.8
Middle Atlantic								
New York	164	143	38.4	−12.8	2,517	3,995	131	− 8.4
New Jersey	73	56	8.7	−23.3	2,861	4,053	76	35.7
Pennsylvania	177	131	9.0	−25.2	2,436	3,742	120	− 8.4
East North Central								
Ohio	96	79	9.7	−17.7	3,222	4,297	79	
Indiana	35	32	8.9	− 8.6	3,199	3,810	29	− 9.4
Illinois	159	112	17.8	−29.5	2,069	3,459	126	12.5
Michigan	50	38	23.0	−24.0	3,389	6,114	37	− 2.6
Wisconsin	6	6	13.2	0.0	1,790	2,026	1	−83.3
West North Central								
Minnesota	6	5	5.1	−16.7	1,574	1,986	5	
Iowa	6	4	− 3.9	−33.3	2,897	4,174	5	25.0
Missouri	72	47	9.2	−34.7	3,109	5,200	55	17.0
North Dakota			−46.7					
South Dakota			−26.6					
Nebraska	7	5	3.0	−28.6	1,965	2,834	4	−20.0
Kansas	14	11	− 1.8	−21.4	4,739	5,922	9	−18.2
South Atlantic								
Delaware	6	5	10.0	−16.7	5,434	7,175	5	
Maryland	34	29	9.2	−14.7	8,129	10,411	27	− 6.9
District of Columbia	72	65	41.8	− 9.7	1,834	2,881	85	30.8
Virginia	63	63	1.7	0.0	10,320	10,499	66	4.8
West Virginia	22	26	2.5	18.2	5,222	4,529	25	− 3.8
North Carolina	68	59	6.8	−13.2	13,510	16,632	75	27.1
South Carolina	54	40	2.6	−25.9	14,698	20,354	43	7.5
Georgia	60	50	1.3	−16.7	17,852	21,699	45	−10.0
Florida	45	39	19.1	−13.3	9,596	13,185	43	+10.3
East South Central								
Kentucky	37	29	− 5.3	−21.6	6,109	7,380	29	
Tennessee	70	74	6.5	5.7	6,824	6,875	71	− 4.1
Alabama	45	38	4.1	−15.6	20,996	25,876	44	15.8
Mississippi	29	29	6.4		34,818	37,054	33	13.7
West South Central								
Arkansas	30	27	0.9	−10.0	15,949	17,873	22	−18.5
Louisiana	45	36	9.4	−20.0	17,252	23,592	34	− 5.6
Oklahoma	18	19	− 1.9	5.6	9,567	8,887	17	−10.5
Texas	100	81	8.1	−19.0	8,550	11,412	90	11.1
Mountain								
Montana			−10.8					
Idaho			−10.9					
Wyoming			−23.5					
Colorado	4	4	2.9		2,957	3,044	4	
New Mexico	2	1	63.9	−50.0	1,425	4,672	2	100.0
Arizona	2	2	39.5		5,375	7,497	3	50.0
Utah			11.5					
Nevada			28.7					
Pacific								
Washington	3	2	8.5	− 33.3	2,280	3,712	2	
Oregon	1		14.8	−100.0	2,234			
California	38	35	53.4	− 7.9	2,133	3,552	23	−34.3

sions. The ratios for 1940 shown in Table 3 will be used rather than those for 1945, since little difference would be noted in the computations and the former is admittedly more accurate. All the Northern states have a dentist-population ratio which is better than the national average. These ratios range from 1 Negro dentist to 1,846 Negroes in Massachusetts to 1 to 6,114 in Michigan. As a matter of fact, nine of the seventeen Northern states have a ratio greater than 1 dentist to 4,000 persons.

The Southern states, with the bulk of Negro population, show a situation of much concern to the public health of this group. Of the sixteen states, only four, Delaware, West Virginia, Kentucky and Tennessee, had ratios better than the national average, but none reached the level of 1 dentist to 4,000 Negroes. The proportion in these states varied from 1 to 4,529 in West Virginia to 1 to 37,054 in Mississippi, where almost one-tenth of the Negro population of the United States resides. The six states with the most unfavorable ratios may be listed as follows: Mississippi, 1 to 37,054; Alabama, 1 to 25,876; Louisiana, 1 to 23,592; Georgia, 1 to 21,699; South Carolina, 1 to 20,354, and Arkansas, 1 to 17,873. These are the same states, in almost the same order, which have the most unfavorable physician-population ratio. The pattern of distribution in the various states reflects the well known fact that professional personnel, whether physicians or dentists, of whatever group, black or white, will settle in the wealthier states where economic advancement takes place more rapidly and where diagnostic and treatment facilities are more plentiful and accessible.

Distribution by Cities

The concentration of dentists in large cities is a phenomenon which has been noted in this country for many years. Table 5 shows the distribution of Negro dentists in cities with 50,000 or more Negroes. Comparison of the percentage which each city's Negro population is to the total Negro population of the state with the percentage which the number of Negro dentists in that city is to the total in the whole state indicates that, in all instances but one, the figure for the latter is higher in both the North and the South. The difference between the percentages of concentration of population and of dentists ranges from 0.4 to 34.0. Baltimore shows the greatest disparity for, although it has 54.9 per cent of the Negro population of the state, it contains 88.9 per cent of the Negro dentists. In the city of New York, the one instance in which this relation was not shown, the difference was small, the two percentages approximating each other. A second expression of this concentration is seen in the fact that, although in 1940 this group of twenty cities had a Negro population of 2,659,022 or about a fifth the nation's total, in 1945 they had 633, or 41.3 per cent, of all the Negro dentists. Thus a little less than 1,000 Negro dentists were left to provide service for the remaining 11,000,000 Negroes in this country.

When all cities are compared, irrespective of region, it is noted that the greatest concentrations of Negro dentists are to be found in the District of Columbia and in Chicago where the ratios of 1 dentist to 2,203 persons and 1 to 2,620, respectively, prevail. The concentration is highest in the District of Columbia because, aside from offering good economic opportunities, it contains Howard University, which trains approximately 50 per cent of the Negro dentists in this country. The lowest ratios of dentists, on the other hand, are to be found in New Orleans and in Atlanta, Ga., where the ratios of 1 to 11,464 and 1 to 10,453, respectively, are encountered. When the Northern and Southern cities are com-

pared, it is found that the Northern cities are in a much more favorable position. The ten Northern cities have an average ratio of 1 dentist to 3,702 persons, while the Southern ones have a ratio of 1 to 5,198.

The distribution of Negro dentists in cities with populations of 25,000 to 49,999 points again to the fact that the highest concentration of dentists is found in urban communities (Table 6). Of the eighteen cities listed, sixteen are in the South. Yet with the exception of Montgomery, Ala., all have ratios which are better than the national average of approximately 1 dentist to 8,700 Negroes. The city with the highest concentration of Negro dentists in 1945 was Nashville, Tenn., with a ratio of 1 to 1,893. The situation in Nashville is similar to that in Washington, D. C., since Meharry Medical College, which trains Negro dentists, is located in this city. There appears to be a slight tendency in the South for the cities with 25,000 to 49,999 Negroes to have a better distribution of Negro dentists than those with 50,000 or more Negroes.

Comment

It is seen from this analysis that the number of Negro dentists is not sufficient to render the minimum in adequate dental care to the Negro population. Even to reach the national average of 1 dentist to 1,800 persons, which existed in 1940 and which is not considered sufficient to meet the dental needs of this country, there would be need for an additional

Table 5.—Distribution of Negro dentists and Negro population and the population per dentist in cities with 50,000 or more Negroes

City	Negro population, 1940	Percentage of total Negro population of state	Negro dentists, 1945	Percentage of total dentists in state	Population per dentist
Atlanta, Ga.	104,533	9.6	10	22.2	10,453
Baltimore	165,843	54.9	24	88.9	6,910
Birmingham, Ala	108,938	11.1	11	25.0	9,903
Chicago	277,731	71.7	106	84.1	2,620
Cincinnati	55,593	16.4	13	20.3	4,276
Cleveland	84,504	29.4	20	31.3	4,225
Dallas, Texas	50,407	5.4	5	5.8	10,081
Detroit	149,119	71.6	28	75.7	5,326
Houston, Texas	86,302	9.3	19	22.1	4,542
Indianapolis	51,142	41.9	16	55.1	3,196
Jacksonville, Fla.	61,782	12.0	7	16.3	8,826
Los Angeles	63,774	51.3	14	60.9	4,553
Memphis, Tenn.	121,498	23.9	26	37.1	4,673
New Orleans	149,034	17.5	13	40.6	11,464
New York	458,444	80.2	103	78.6	4,451
Philadelphia	250,880	53.4	73	60.8	3,437
Pittsburgh	62,216	13.2	15	15.0	4,148
Richmond, Va.	61,251	9.3	11	16.9	5,568
St. Louis	108,765	44.5	34	61.8	3,199
Washington, D. C.	187,266	.....	85	.....	2,203
Totals					
Ten Southern cities	1,096,854	.....	211	.....	5,198
Ten Northern cities	1,562,168	.....	422	.....	3,702

Table 6.—Distribution of Negro dentists and Negro population and the population per dentist in cities with 25,000 to 49,999 Negroes

City	Negro population, 1940	Negro dentists, 1945	Population per dentist
Augusta, Ga.	27,004	5	5,401
Charleston, S. C.	31,765	5	6,353
Charlotte, N. C.	31,403	7	4,486
Chattanooga, Tenn.	36,404	5	7,281
Columbus, Ohio	35,765	10	3,577
Fort Worth, Texas	25,254	6	4,209
Kansas City, Mo.	41,574	12	3,431
Louisville, Ky.	47,158	14	3,368
Macon, Ga.	25,604	4	6,401
Miami, Fla.	36,857	4	9,214
Mobile, Ala.	29,046	6	4,841
Montgomery, Ala.	34,535	2	17,268
Nashville, Tenn.	47,318	25	1,893
Newark, N. J.	45,760	16	2,860
Norfolk, Va.	45,893	7	6,556
Savannah, Ga.	43,237	6	7,206
Shreveport, La.	35,975	6	5,896
Winston-Salem, N. C.	36,018	9	4,002

6,000 Negro dentists. The solution of this problem is of particular significance to the public health of the country.

I wish to suggest certain pathways through which a solution may be attained. First, it would be desirable to develop the two dental schools for Negroes to their fullest capacities and to provide sufficient fellowships, scholarships and loan funds for students so that enrollment could be kept at a high peak for many years to come. Second, the thirty-eight dental schools other than Howard University and Meharry Medical College will have to assume a more liberal attitude and admit a larger number of Negroes to their classes. Third, a program of vocational guidance will have to be developed for Negro high schools and colleges located in the South so that more and more well qualified Negro students will be stimulated to enter the field of dentistry. A good promotional job for dentistry needs to be done, and this should be a challenge to dental organizations and other agencies interested in health. Finally, it appears that Southern states and communities will have to develop a program of subsidization whereby Negro youths of promise will be chosen and sent to dental schools at the expense of the community, state or some foundation, with the understanding that these persons will return to their respective states as soon as they have completed their dental training. These are four possible avenues of approach which will have to be considered in any program for better dental care for all people.—*School of Medicine, Howard University.*

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JUNE 1, 1947 • VOLUME 34 • NUMBER 11

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Published by the American Dental Association • 222 East Superior St. • Chicago 11, Ill.

EDITORIALS

DENTAL RESPONSIBILITY IN THE CONTROL OF CANCER

THE present national campaign of the American Cancer Society to collect $12,000,000 for cancer control serves to concentrate attention on the nation's second greatest public health enemy. Ten per cent of all malignant tumors recorded annually are reported as cancer of the mouth. The annual death rate from buccal cancer is estimated at 5,000, and there is evidence that a material reduction of this figure could be secured through increased vigilance on the part of dentists. Buccal cancer can be controlled through early detection and the diagnosis and treatment of precancerous lesions. Dentists are more likely than physicians to observe precancerous buccal lesions in routine examination, and thus the prompt referral of patients with actual or suspected lesions for biopsy and medical attention can be a definite factor in reducing cancer mortality.

Total national resources are being marshaled against this dramatic disease. An intensive program of cancer research has been established by the federal government at the National Institute of Health. An additional $2,500,000 recently has been made available to the United States Public Health Service for grants-in-aid to state health authorities. These funds may be used by the state for surveys, epidemiologic studies and diagnostic purposes. The training of personnel, including the use of postgraduate courses for dentists, physicians and other members of the health professions, also is authorized along with the establishment of diagnostic and treatment facilities in the state.

This program of the United States Public Health Service has considerable interest for the dental profession since it will enable the dentist to participate more effectively in the fight against cancer. Under it, postgraduate courses in the diagnosis and prevention of oral cancer will be made available to dentists. Oral diagnostic and treatment services will be extended in hospitals and health centers. Dentists will be given

an opportunity for participating in cancer surveys, and an increased use of existing diagnostic laboratory facilities by dentists will be stimulated. The program also includes plans for providing dentists and dental students with training and experience in the diagnosis of cancerous and precancerous lesions. Study groups, continuation study courses, lectures and other methods will be used to make the program of the widest practicality and effectiveness in cancer control.

State and local dental societies should participate actively in this program. Definite agencies or committees should be assigned to perfect cooperation in the broad aspects of this national attack on this disease.

AMERICAN DENTAL ASSOCIATION APPOINTS A MEDICO-DENTAL RELATIONS COMMITTEE

THE appointment by President Mead of a Committee on Medico-Dental Relations is an important initial step in bringing about closer cooperation between the two professions. It is gratifying to note that a similar committee has been appointed by the American Medical Association.

Most of the problems which confront both medicine and dentistry can be grouped into two categories: those that affect private practice and those that pertain to the broader field of public health.

In private practice, improvements can be brought about through closer cooperation between the patient's physician and dentist, as specialists in both professions have long since learned. The pediatrician consults normally with the pedodontist, the orthodontist with the pediatrician, the ophthalmologist with the oral surgeon and the periodontist with the internist. This type of productive cooperation should be extended widely to include all practitioners of both professions. The patient does not expect medical care from his dentist nor dental care from his physician, but he does have a right to expect such intelligent cooperation in the interest of his personal health.

In the broader field of public health and socio-economics, medicine and dentistry are faced with many problems. The growing interest in public health, the demand for hospitals and health centers, the development of dental facilities in hospitals and the improvement of health services for children present many questions for which the two professions must find more comprehensive answers.

These problems will not be solved by committees alone. Their solution will depend on the cooperation received from all members of both professions.

The appointment of national committees on medico-dental relations might well lead to the appointment of similar committees at state and local levels. Eventually the expanding recognition of the community and state as esssential health units should lead to the development of councils in which all health professions will participate.

A. D. A. AFFAIRS

STATE SECRETARIES REQUESTED TO SUGGEST BOSTON CLINICIANS

The secretaries of state dental societies have been asked by the American Dental Association to suggest clinicians for the clinic program at the eighty-eighth annual meeting of the American Dental Association, to be held August 4-8 in Boston.

Anyone who wishes to participate in the clinic program should contact the secretary of his state dental society.

Three clinic sessions will be held at the Boston meeting, on the afternoon of Thursday, August 7, and in the morning and afternoon of Friday, August 8. A special program with clinics from the New England states only is planned for Friday afternoon.

The American Dental Assistants Association and the American Dental Hygienists' Association will also present clinic programs at the meeting.

PROGRAM ANNOUNCED FOR STATE OFFICERS MEETING

The annual Conference of State Society Officers will be held August 3 in the Hotel Statler, Boston, in conjunction with the eighty-eighth annual meeting of the American Dental Association. The meeting will be held August 4-8 in Boston.

Officers for the Conference of State Society Officers are L. M. Cruttenden, St. Paul, president; Robert L. Borland, Los Angeles, vice-president, and H. K. Willits, Reading, Pa., secretary.

Speakers on the preliminary program for the conference are William H. Crawford, dean, School of Dentistry, University of Minnesota, on "The United Front: Dentistry and Medicine"; Arthur E. Neelley, executive secretary, Southern California State Dental Association, on "Getting the Job Done: The Resources of State Dental Societies," and Sterling V. Mead, president, American Dental Association.

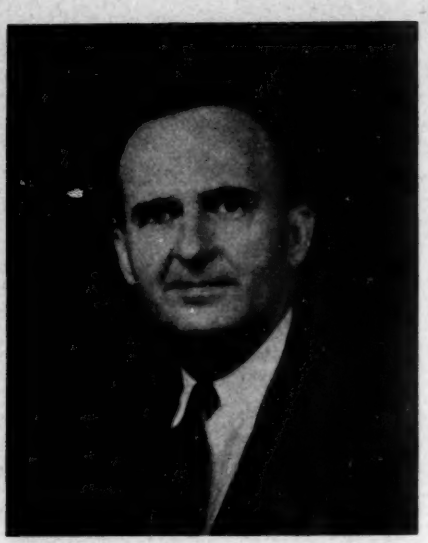
Speakers to talk on the topic of "Planning a Program for State Dental Societies: The Use of the Workshop" are William W. Hurst, president, Ohio State Dental Society; Harry B. Millhoff, chief, division of dental hygiene, Ohio Department of Health, and LeRoy Johnson, chairman, Council on Dental Health, Ohio State Dental Society.

At an open forum for state and American Dental Association officers on the subject "What Are Your Problems?" the speakers will be H. B. Washburn, president-elect, American Dental Association; Harold Hillenbrand, general secretary, American Dental Association; LeRoy M. Ennis, trustee, third district, American Dental Association, and Willard Ogle, secretary, Texas State Dental Society, and trustee, twelfth district, American Dental Association.

COUNCIL ON DENTAL HEALTH TO MEET AT BOSTON SESSION

The Council on Dental Health of the American Dental Association will hold a meeting July 31 and August 1-2 in the Hotel Statler, Boston, in connection with the eighty-eighth annual meeting of the American Dental Association August 4-8 in Boston, according to an announcement by Allen O. Gruebbel, secretary of the Council.

A conference of state society councils on dental health will be held August 5 in the Hotel Statler, Dr. Gruebbel said. All dentists interested in the work of the councils on dental health are invited to attend the meeting.



New Therapeutics Member
Holmes T. Knighton, professor of bacteriology, School of Dentistry, Washington University, St. Louis, has been appointed a member of the Council on Dental Therapeutics of the American Dental Association

H. T. KNIGHTON APPOINTED TO DENTAL THERAPEUTICS COUNCIL

Holmes T. Knighton, professor of bacteriology, School of Dentistry, Washington University, St. Louis, has been appointed a member of the Council on Dental Therapeutics of the American Dental Association by Sterling V. Mead, president of the American Dental Association.

Dr. Knighton succeeds J. Howard Brown, associate professor of bacteriology, Johns Hopkins University, who resigned his post as a member of the Council recently.

Dr. Knighton has been a public health dentist in Florence, Ala., 1929-1930; an intern at the Forsyth Dental Infirmary, Boston, 1930-1931; a Rockefeller Fellow in Dental Research, University of Rochester, 1931-1933; an instructor in medical bacteriology, University of Georgia Medical School, 1933-1934, and an instructor in operative dentistry, Dental School, Medical College of Virginia, 1934-1936.

He was an assistant and then associate professor of bacteriology, University of Louisville, 1936-1946, and professor of dental medicine, School of Dentistry, Washington University, 1946-1947.

DENTAL EDUCATION COUNCIL TO MEET AUGUST 1 IN BOSTON

The Council on Dental Education of the American Dental Association will hold a meeting August 1 in the Hotel Statler in Boston, according to an announcement by Harlan H. Horner, secretary of the Council.

The meeting will be held in conjunction with the eighty-eighth annual meeting of the American Dental Association, to be held August 4-8 in Boston.

SCIENTIFIC EXHIBIT ENTRIES REQUESTED FOR ANNUAL MEETING

Dentists and dental and other scientific organizations have been invited to present exhibits at the eighty-eighth annual meeting of the American Dental Association by the Committee on Scientific and Health Exhibits of the Association. The meeting will be held August 4-8 in Boston.

An unusual number of excellent exhibits is expected by the Committee, as this convention will be the first full scale scientific meeting held by the American Dental Association since 1941.

Exhibits are being entered in three classes. Class A consists of original and individual investigations, which will be judged on the basis of originality and excellence of presentation.

Class B exhibits represent originality in the correlation of facts and in the improvement of technics which will aid the practitioner and will be judged on the

value to the profession and on the excellence of their presentation. Class C exhibits consist of health educational projects and will be judged on the subject matter and on the quality of presentation.

The American Dental Association will present a certificate of award to the winners of first, second and third place in each of the three classes.

AMERICAN SOCIETY OF DENTISTRY FOR CHILDREN TO MEET IN BOSTON

The American Society of Dentistry for Children will meet August 2-4 in the Somerset Hotel, Boston, according to an announcement by R. M. Erwin, Jr., Portland, Ore., secretary.

The meeting will be held in connection with the eighty-eighth annual meeting of the American Dental Association, to be held August 4-8 in Boston. J. M. Wisan, Trenton, N. J., is president of the American Society of Dentistry for Children, and Elsie Gerlach, Chicago, is treasurer.

BOSTON HOTEL RESERVATIONS MUST BE CONFIRMED IN JUNE

Forms to be used in confirming hotel reservations made for the eighty-eighth annual meeting of the American Dental Association August 4-8 in Boston will be sent out sometime during June by the Housing Bureau of the Boston Chamber of Commerce.

All holders of hotel reservations will receive a card which must be filled out and returned within ten days of its receipt. Failure to return the card confirming the reservation may result in cancellation of the reservation at the option of the Housing Bureau.

Anyone planning to attend the meeting who has not yet made hotel reservations should do so at once because of the critical shortage of hotel rooms in Boston, although every effort will be made to accommodate all members of the American Dental Association who need reservations.

Application blanks to be used in applying for hotel reservations will be found on pages A-22 and A-23 of this issue of THE JOURNAL, along with a list of available Boston hotels and their scales of rates. All reservations must be made through the Housing Bureau, 80 Federal St., Boston 10.

Most of the official delegates will be housed in the Hotel Statler, headquarters hotel for the meeting. The House of Delegates will meet in the Hotel Statler, and the scientific sessions will be held in Mechanics Building.

DENTAL EDITORS ASSOCIATION TO MEET AUGUST 2 IN BOSTON

The American Association of Dental Editors will hold a full day meeting August 2 in the Hotel Statler, Boston, in connection with the eighty-eighth annual meeting of the American Dental Association, according to an announcement by O. W. Brandhorst, St. Louis, secretary.

Details of the program for the meeting will be announced later. Dr. Brandhorst has requested that all members of the American Association of Dental Editors plan to attend the meeting.

TWO SUGGESTIONS ADOPTED BY MILITARY AFFAIRS COMMITTEE

The Committee on Military Affairs of the American Dental Association, which was set up as a standing body by the House of Delegates at the eighty-seventh annual meeting in Miami, at a recent meeting adopted the following suggestions to be forwarded to all state and component societies:

That the name of the respective committees in state and local societies functioning as this committee at the national level, be named "Military Affairs Committee" in order to bring about uniformity of terminology between national and local committees, and that state and local committees forward suggestions or

resolutions to the secretary of this committee, concerning problems of dental veterans, and the present and future status of the Dental Corps of the Army, Navy, Public Health Service and Veterans Administration. It is felt that valuable information and suggestions for improvement in the various Corps can now be obtained if veterans will thoroughly consider these problems, individually and collectively, based upon their experiences during World War II.

The committee has urged that state and component committees become active during the next months so that a complete report may be presented to the House of Delegates at the eighty-eighth annual meeting, to be held August 4-8 in Boston.

Olin Kirkland, Montgomery, Ala., is chairman of the committee, and C. Willard Camalier, Washington, D. C., is secretary.

DENTAL EDUCATION COUNCIL APPROVES ORAL SURGERY BOARD

The Council on Dental Education of the American Dental Association has approved the American Board of Oral Surgery, according to an announcement by Harlan H. Horner, secretary of the Council.

The Council on Dental Education adopted requirements for the approval of specialty examining boards at its meeting on February 7. The requirements as adopted were printed in the April 15 issue of THE JOURNAL.

ARMY AND NAVY

GENERAL R. W. BLISS NAMED SURGEON GENERAL OF THE ARMY

Brig. Gen. Raymond W. Bliss, deputy surgeon general of the Army for the past year, succeeded Maj. Gen. Norman T. Kirk as Surgeon General of the Army May 31 when General Kirk's four year term in office expired.

General Kirk retired from active duty upon expiration of his term.

Col. George E. Armstrong, chief, office of personnel of the Office of the Surgeon General, was appointed deputy surgeon general with the rank of brigadier general for a four year term.

General Bliss was graduated from Tufts College Medical School and entered the medical reserve corps in 1911. He was graduated from the Army Medical College in 1913 and in 1921 became executive officer of the hospital subdivision of the Veterans Bureau in Washington. He was named surgeon general of the First Army and Eastern Defense Command in 1942, was assigned as chief of operations and assistant surgeon general in 1943 and was appointed deputy surgeon general in 1946.

Colonel Armstrong was graduated from the Medical School of Indiana University and has served as director of the department of medical administration in the Medical Field Service School. He was also chief surgeon of the China Theater in 1944.

FEDERAL AGENCIES

COMPILATION OF MEDICAL RESEARCH REPORTS AVAILABLE

An indexed compilation of almost one thousand medical research reports from American and foreign sources is now available to the professions and other interested persons through the Office of Technical Services, Department of Commerce.

The compilation was prepared by the U. S. Medical Library and covers a wide field of medical research in Germany, Japan and the United States. The compilation was published in the *Current List of Medical Literature,* publication of the Medical Library, and will be continued with current lists in subsequent issues.

DENTAL SOCIETIES

TENNESSEE TO HOLD FIFTH POSTGRADUATE DENTAL SEMINAR

The fifth annual Postgraduate Dental Seminar will be presented June 9 to July 19 by the Tennessee State Dental Association in cooperation with the Tennessee Department of Public Health.

The subject of the seminar this year will be preventive and protective procedures involved in the care of children's teeth. Instructors will be Joseph T. Hartsook, clinical instructor of pedodontics, School of Dentistry, University of Michigan, and Henry M. Wilbur, associate professor of restorative dentistry, School of Dentistry, University of Louisville.

Carl L. Sebelius, Nashville, Tenn., is director of the seminar committee. Lectures and clinics will be presented in a number of cities throughout Tennessee during the course of the seminar. For further information, write Dr. Sebelius at 420 Sixth Ave., N., Nashville 3.

MEMBERS OF CENTRAL SECTION ORTHODONTISTS HOLD MEETING

The Central Section of the American Association of Orthodontists held a recent two day session in Minneapolis with a total attendance of 162 members and guests.

Guest speakers on the program were George R. Moore and G. Vernon Fisk, both from the Great Lakes Association of Orthodontists, and Carl W. Waldron, head of the department of oral surgery, University of Minnesota.

Essayists were Bernard G. De Vries, Howard E. Strange, L. Bodine Higley, Henry F. Westhoff, Howard Yost, Leonard P. Wahl, R. C. Willett, John R. Thompson and Arthur C. Rohde, all members of the central section.

H. B. Washburn, president-elect of the American Dental Association, was the guest speaker at the banquet. Officers elected for the coming year were Ralph G. Bengston, Chicago, president; J. H. Williams, St. Louis, president-elect; L. Bodine Higley, Iowa City, vice-president, and Earl E. Shepard, St. Louis, secretary-treasurer.

NORTHEASTERN ORTHODONTIC SOCIETY LISTS NEW OFFICERS

John W. Ross, Philadelphia, was elected president of the Northeastern Society of Orthodontists at its recent annual meeting. The society was formerly called the New York Society of Orthodontists.

Other new officers are Norman L. Hillyer, New York, president-elect; Lawrence W. Baker, Boston, vice-president; J. A. Salzmann, New York, editor and director; Joseph D. Eby, New York, sectional editor; Clifford G. Glaser, Buffalo, alternate director, and Oscar Jacobson, New York, secretary-treasurer.

The society has announced that it will hold its next meeting November 10-11 at the Waldorf-Astoria Hotel, New York.

DENTAL MEDICINE SEMINAR TO BE HELD OCTOBER 19-24

The Fourth Annual Seminar for the Study and Practice of Dental Medicine, sponsored by all the Pacific Coast dental associations, will be held in Yosemite Valley, Calif., October 19-24, according to Hermann Becks, president of the board of directors and professor of dental medicine, University of California.

The speakers scheduled for the seminar will include William A. Albrecht, University of Missouri; Allan G. Brodie, Isaac Schour and John B. Youmans, all of the University of Illinois; Thomas Francis, Jr., Howard B. Lewis and L. H. Newburgh, all of the University of Michigan, and Gustav W. Rapp, Loyola University, Chicago.

Photo by Howard A. Hartman

Officers of American Academy of Oral Pathology

Officers of the American Academy of Oral Pathology, which held its first annual meeting during the midwinter meeting of the Chicago Dental Society, are, from left to right, Hamilton B. G. Robinson, College of Dentistry, Ohio State University, editor; James Roy Blayney, University of Chicago, second vice-president; Kurt H. Thoma, chief, dental department, Massachusetts General Hospital, president, and Col. Joseph L. Bernier, Army Institute of Pathology, secretary-treasurer

LATEST DENTAL SOCIETY ACTIVITIES AND MEETINGS

Alabama.—Officers elected at the seventy-eighth annual meeting of the Alabama Dental Association were Angus M. Sellers, Birmingham, president; W. A. Wood, Mobile, president-elect; H. T. McKinnon, Jr., Troy, vice-president, and George W. Matthews, Birmingham, who was re-elected to the post of secretary-treasurer and editor of the *Bulletin*.

The meeting was the largest ever held by the association. A total of 425 attended, and the membership at the close of the meeting was 511, putting the association over the 500 mark for the first time in its history.

The Alabama State Board of Dental Examiners will meet June 23-27 in Birmingham, according to an announcement by M. W. Gaillard, Mobile, secretary.

Connecticut.—The eighty-second annual meeting of the Connecticut State Dental Association will be held June 3-5 in New London, according to an announcement by E. S. Arnold, West Hartford, secretary-treasurer.

The meeting this year is being handled as a "vacation-convention," with all facilities designed for relaxation as well as for a scientific program, according to an announcement by Dr. Arnold.

The principal speakers on the program will include Edward Gipstein, New London, on "The Dentist and His Health"; A. James Kershaw, West Warwick, R. I., on "Dental Economics"; George B. Morris, New York, on "Full Dentures"; Joseph F. Volker, Tufts College Dental School, on "Caries Control in General Dentistry," and Alvin E. Strock, Harvard Medical School, on "Forms and Uses of Penicillin in Dentistry."

Others on the agenda will be Edwin M. Scribner, Boston, on "The Conservative Preparation of Teeth for Indirect Inlays"; Irving Salman, New York University, College of Dentistry, on "Oral Surgery," and William E. Burke, Tufts College Dental School, on "Amalgam Restorations." John T. Fulton, Washington, D. C., and Frank E. Law, Woonsocket, R. I., will speak on a symposium on caries control, and the Alfred C. Fones Award will be presented to J. L. T. Appleton, dean, School of Dentistry, University of Pennsylvania.

The Connecticut Dental Commission will conduct examinations for license to practice dentistry and dental hygiene June 24-28 in Hartford. Applications must reach the recorder, Clarence C. Brooks, at least ten days before the meeting. For further information write Dr. Brooks, 302 State St., New London, Conn.

Idaho.— The twenty-seventh annual meeting of the Idaho State Dental Association will be held June 9-11 in Sun Valley, according to an announcement by H. F. Miller, Moscow, secretary.

Clinics on the program will be conducted by John C. Brauer, professor of pedodontia, School of Dentistry, University of Washington, Seattle, and Lyall O. Bishop, clinical instructor in oral surgery, College of Physicians and Surgeons, San Francisco. Dr. Brauer will hold a clinic on "Etiology and Control of Dental Caries." Dr. Bishop will conduct a clinic on "The General Principles of Exodontia and Surgical Procedures" and will show motion pictures on "The Mandibular Third Molar."

Maine.—The annual meeting of the Maine Dental Society will be held June 5-7 in Poland Spring, according to an announcement by Alonzo H. Garcelon, Augusta, secretary.

The speakers on the program will include I. K. Lowry, former professor of prosthetics, McGill University, on "Full Denture Technic"; Stephen P. Mallett, Boston, on "Oral Surgery," and J. Murray Gavel, Boston, on "Helpful Hints in Dentistry."

The program has been designed primarily as a refresher course for veteran dental officers, Dr. Garcelon said.

Michigan.—The new officers of the Michigan State Dental Society elected at the recent annual meeting were C. H. Jamieson, Detroit, president; L. H. Andrews, St. Joseph, president-elect; G. W. Christiansen, Detroit, vice-president; Fred Wertheimer, Lansing, secretary; A. H. Lowther, Detroit, treasurer, and W. G. McBride, Detroit, editor.

The Michigan State Board of Dental Examiners will meet June 16 in Detroit, according to an announcement by J. L. Champagne, Detroit, secretary.

Mississippi.—The annual meeting of the Mississippi Dental Association will be held June 1-4 in Biloxi.

The principal speakers on the agenda will include Olin Kirkland, Montgomery, Ala., on "Conservative Treatment of Periodontal Diseases"; Reeves F. Wells, Panama City, Fla., on "Full Denture Impressions Which Result in Stable Dentures"; Claude C. Cannon, Fayette, Ala., on "Amalgam," and Mims Gage, Tulane University, New Orleans, on "Oral Carcinoma."

The Mississippi State Board of Dental Examiners will meet June 17-19 in Jackson, according to W. R. Madden, Forest, secretary.

Missouri.—The St. Louis Dental Society observed National Child Health Day May 2 with an afternoon and evening program devoted to dentistry for children.

A dinner was held in honor of David W. Brock, St. Louis, in recognition of his efforts in promoting dental health for children. Dr. Brock was largely responsible for the establishment of the dental health program in schools in St. Louis and St. Louis County, according to H. F. Westhoff, president of the St. Louis Dental Society.

New Hampshire.—The annual meeting of the New Hampshire Dental Society will be held June 15-17 in Portsmouth, according to an announcement by F. E. Williams, Manchester, secretary.

Speakers on the agenda for the meeting will include Joseph F. Volker, Boston, on "Diagnosis and Treatment of Caries"; Carlisle C. Bastian, New York, on "The Use of Porcelain Jacket Crowns for Bridgework and Bite Opening Cases"; Leon Lieber, New York, on "Thermal Control of Dental Drilling"; Daniel J. Holland, Jr., Boston, on "Treatment of

Complications in Exodontia and Oral Surgery," and Herbert L. Esterberg, Newton, Mass., on "Immediate Dentures with Special Attention to Facial Features."

Other speakers are Alvin E. Strock, Boston, on "Penicillin, Its Forms and Uses in Dentistry"; Harold P. W. Harby, Plymouth, Mass., on "Dentistry for Children"; Edward Reiter, Cleveland, on "Correction of Protrusive Mandibles," and V. H. Kazanjian, Boston, on "Surgical Preparation of the Mouth for Dentures."

Ohio.—The Ohio State Board of Dental Examiners will conduct examinations for license to practice dentistry and dental hygiene June 16-21 in Cleveland, according to an announcement by E. D. Lowry, Columbus, secretary.

Practical examinations for dentists will be held June 16-18, and practical tests for hygienists will be held June 17. Theory tests will be held June 19-21.

Oregon.—The fifty-fourth annual session of the Oregon State Dental Association will be held June 5-7 in Portland, according to an announcement by W. H. Hurley, Portland, secretary-treasurer.

The guest essayists on the program for the meeting include James T. Sweeney, Lodi, Calif., on "Uniform Amalgam Technic"; John C. Brauer, professor of pedodontia, School of Dentistry, University of Washington, Seattle, on "The Child in Your Practice"; Bernhard Gottlieb, Baylor University, Dallas, Texas, on "Dental Caries" and "Periodontia," and Jack Werner, College of Physicians and Surgeons, San Francisco, on "Denture Construction."

Pennsylvania.—The Pennsylvania State Board of Dental Examiners will conduct examinations June 23-28 in Philadelphia and Pittsburgh for license to practice dentistry and dental hygiene, according to an announcement by R. E. V. Miller, Easton, secretary.

Written examinations will be held June 24-25 for dentists and June 24-25 for hygienists. Clinical tests will be held June 26-28 for dentists and June 26 for hygienists.

South Dakota.—The sixty-fourth annual meeting of the South Dakota State Dental Society is being held May 29-31 in Black Hills, according to an announcement by E. W. Elmen, Sioux Falls, secretary.

Speakers on the program include Sam W. Williams, Minneapolis; Allen O. Gruebbel, secretary of the Council on Dental Health, American Dental Association; A. L. Russell, Pierre; B. E. Bensem, Sioux Falls, Veterans Administration; Norman C. Carlson, Lincoln, Nebr., and A. T. Thorsen, Minneapolis.

The South Dakota State Board of Dental Examiners will meet June 22-26 in Sioux Falls, according to an announcement by T. E. Barrington, Rapid City.

Wisconsin.—Officers elected at the recent seventy-seventh annual meeting of the Wisconsin State Dental Society were William H. Schaller, Milwaukee, president; A. H. Finke, Sheboygan, president-elect; H. M. Uebele, Milwaukee, first vice-president; Glenn Bennett, Wisconsin Rapids, second vice-president; C. P. Collins, Kenosha, treasurer; R. A. Mason, Milwaukee, elected secretary; J. S. Danforth, Sheboygan, librarian, and L. D. McCudden, Milwaukee, historian.

Kenneth F. Crane, Milwaukee, executive secretary, has announced that registration at the meeting reached an all time high of 2,443. A total of 1,395 members and junior members was reported at the meeting.

The woman's auxiliary presented a check for $2,821 to the Relief Fund at the meeting. The money was raised over a period of a year through the sale of scrap amalgam collected by the auxiliary.

The Wisconsin State Board of Dental Examiners will meet June 9-13 in Milwaukee, according to an announcement by S. F. Donovan, Tomah, secretary.

Wyoming.—The annual meeting of the Wyoming State Dental Association will be held June 19-21 in Casper, according

to an announcement by G. S. King, Casper, president-elect.

Speakers on the program will include Donald E. Kellogg, Chicago, on "Periodontia"; Harold L. Harris, Denver, on "Lower Dentures," and C. H. Swanson, Columbus, Mont., on "Amalgam Restorations."

The Wyoming State Board of Dental Examiners will meet June 23 in Casper, according to O. R. Docekal, Sheridan, secretary.

DENTISTRY ABROAD

BRITISH DENTAL ASSOCIATION TO HOLD SESSION JUNE 16-20

The first annual peacetime general meeting of the British Dental Association will be held June 16-20 in Bournemouth, England, under the presidency of Edward Sampson.

A paper and discussion on "Nutrition and Dental Health" will be held, followed by table demonstrations and films. Speakers will be Lord Teviot, Everard Turner and R. Weaver. A paper on "Acrylics in Dentistry" will be presented by A. C. Deverell, director of the Eastman Dental Clinic, London, with discussion to be opened by Robert Cutler and H. A. Pitt Roche.

H. H. Boyle will present a paper on "The Importance of the Vertical Height in Full Denture Prosthesis." Approximately 600 persons are expected to attend the meeting.

GERMAN DENTIST REQUESTS AMERICAN CORRESPONDENCE

A German dentist, J. Diederich of Fritzlar, district of Kassel, has written the United States Department of State requesting the names of some American dentists with whom he may correspond.

The State Department has referred the request to the American Dental Association and has asked that every effort be made to establish a correspondence between Dr. Diederich and some American dentists, as the State Department wishes to facilitate as much as possible the re-education of the German people.

Dr. Diederich, in his letter to the State Department, said that he wished to write to colleagues in America on scientific subjects and that he was extremely interested in discovering what a dentist's practice in America is like and on what scientific basis an American dentist is trained.

Any dentist interested in writing to Dr. Diederich may contact him at the following address: Dr. J. Diederich, Stadtische Sparkasse Fritzlar Nr. 1718, Fritzlar, Bezirk Kassel, Germany.

EDITOR OF FRENCH DENTAL JOURNAL, MAURICE ROY, DIES

Maurice Roy, editor of *L'Odontologie*, French dental journal, died January 5, 1947, at the age of 81.

Dr. Roy had been editor-in-chief of *L'Odontologie* since 1906 and manager of the publication since 1923. The journal is published by the French Dental Society.

Dr. Roy also was director of the faculty of *L'Ecole Dentaire de Paris* and had been one of the founders of the *Fédération Dentaire Nationale* and of the *Fédération Dentaire Internationale*. He was one of the first vice-presidents of the latter organization.

NEW CUBAN SOCIETY PUBLISHES CHILDREN'S DENTISTRY JOURNAL

A new Cuban dental journal, *Odontologica Infantil* (Children's Dentistry), is being published by the newly formed Cuban Society of Dentistry for Children.

The editor of the new journal is Carlos A. Criner Garcia, president of the dental

society. The first issue of the magazine described a course in children's dentistry offered at the University of Havana in 1946 which aroused such interest as to lead to the formation of the new society.

The new magazine also announced the election by the society of Kenneth A. Easlick, Ann Arbor, Mich., to honorary membership. Dr. Easlick is chairman of the Section on Dentistry for Children and Oral Hygiene of the American Dental Association and is a member of the Council on Dental Health.

PARLIAMENT HEARS DENTAL RATIO IN BRITISH MILITARY SERVICES

The Parliamentary Secretary to the British Admiralty reported recently in the British House of Parliament on the current ratio of dentists to personnel in the military services.

The current ratio is 1.21 to 1,000 in the navy, 0.64 to 1,000 in the army and 0.5 to 1,000 in the air force. During the war the ratio was 0.75 to 1,000 for the navy, 0.7 to 1,000 for the army and 0.73 to 1,000 for the air force.

HUNGARIAN DENTAL CONGRESS PLANNED FOR SEPTEMBER, 1947

The dentists and oral surgeons of the Hungarian Medical Union have announced that a dental congress will be held next September in Budapest in commemoration of the twenty-fifth anniversary of the death of Prof. Joseph Arkovy, first professor of stomatology on the medical faculty of the University of Budapest.

Dentists and oral surgeons in the United States are invited to attend the congress and to present scientific lectures if they wish. Transportation can be arranged through the Hungarian Embassy.

For further information write Magyar Orvosok, Szabad Szakszervezete, Fogorvos szakcsoport, Budapest, V., Nador-U, 32.

VETERANS

MANITOBA ADOPTS RESOLUTIONS ON VETERANS DENTAL SERVICES

Two resolutions concerning the Dental Veterans Administration which were passed at the annual meeting of the Manitoba Dental Association of Manitoba, Canada, have been referred to the Dental Services Committee of the Canadian Dental Association for consideration.

The first resolution calls attention to the discrepancy in the dental fees paid by the Dental Veterans Administration for services rendered to ex-service personnel as compared with the fees paid in the United States for similar services, and urges that the Canadian Dental Association endeavor to have the fee schedule revised upward with a fee included for examinations.

The second resolution urges that all persons receiving Dental Veterans Administration benefits be permitted to go to their own dentists for dental care and treatment.

Acme Photo

Dentist Heads VFW Post

Yoshizo Harada, right, dentist who served as a major with the United States Army in Europe, is commander of VFW post 8935 in Sacramento, Calif., first all-Nisei veterans organization in the country. Charles P. Ash, left, commander of the California VFW Department, congratulates Dr. Harada. W. Sakai, center, is service vice-commander of the new post

PUBLIC HEALTH

NEW ENGLAND HEALTH INSTITUTE WILL INCLUDE DENTAL SPEAKERS

The New England Health Institute will be held by the New Hampshire State Department of Health at the University of New Hampshire, Durham, N. H., June 16-18, according to an announcement by H. Shirley Dwyer, chairman of public relations for the institute.

Sections at the institute will include all aspects of public health care and training, with speakers drawn chiefly from the public health field and from universities. The public is invited to attend the meetings.

Dental speakers on the program will include Frank E. Law, senior dental surgeon, director of the Woonsocket, R. I., dental demonstration program, U. S. Public Health Service, on "Woonsocket Meets the Dental Program"; John F. County, supervisor of the dental service, Verney Corporation, on "Industrial Dental Service"; John Fulton, dental consultant, Children's Bureau, U. S. Public Health Service, participating in a panel discussion on child development, and J. M. Wisan, chief, division of dental health, New Jersey Department of Health, on "Securing Lay Cooperation in a Health Program."

CONFERENCE ON HEALTH IN COLLEGES HELD IN NEW YORK

The Third National Conference on Health in Colleges met May 7-10 in New York with an attendance of approximately 500 representatives of colleges and organizations interested in the health of college students.

The conference was sponsored by the American Association of Teachers Colleges, the Association of American Colleges, the American Student Health Association, the American Association for Health, Physical Education and Recreation, and the National Health Council.

The American Dental Association was represented by a Committee on Dental Health set up for the conference to study and present recommendations on various phases of the student health problem.

Members of the committee were Leon R. Kramer, Topeka, Kan., chairman; Frank C. Cady, New York; William Gray, St. Paul; Allen O. Gruebbel, secretary of the Council on Dental Health of the American Dental Association; Lon W. Morrey, editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION; J. M. Wisan, Trenton, N. J.; J. A. Salzmann, New York; P. E. Blackerby, Battle Creek, Mich.; John F. Turner, Washington, D. C., and Randolph G. Bishop, Washington, D. C.

WISCONSIN HEALTH BOARD GIVES FLUORINATION POLICY

The Wisconsin State Board of Health at a recent meeting restated its policy on the subject of fluorination of city water supplies. The resolution adopted follows:

> Controlled fluorination of drinking water appears to give promise of a substantial reduction in tooth decay to children whose mothers were ingesting protective amounts of fluorine during pregnancy and who, as infants and children, have continued to use water containing one to one and a half parts per million of fluorine during their first twelve years of life, and therefore the Board is in accord with having cities set up fluorination projects where acceptable controls are established and maintained.

RED CROSS CONDUCTS COUNTY SCHOOL DENTAL CARE PROGRAM

Children in seventy-one schools in Onondaga County, New York, receive instruction and care in dental hygiene under a health service plan conducted by the Red Cross and supervised by the Syracuse Dental Society.

Two full time dental hygiene instructors are sent from school to school to instruct children in the elementary grades in the care of their teeth, to clean the teeth and to refer the children to a dentist for further dental treatment.

Of the 4,460 children whose teeth have been examined during the past year, 2,901 have needed corrective work by a dentist. A total of 2,016 children have had their teeth cleaned by the hygiene instructors. The entire program is supervised by Clayton L. Ripley, appointed by the Syracuse Dental Society, and by Frederick H. Markham, appointed by the County Dental Coordinating Committee of eighteen members representing agencies interested in the program.

DENTAL EDUCATION

NEW YORK UNIVERSITY HOLDS ANNUAL ALUMNI DAY MEETING

The College of Dentistry, New York University, held its annual alumni day recently with an attendance of more than 650.

A number of clinics were held under the direction of members of the Alumni Association. Harold O. Voorhis, vice chancellor and secretary of the University, and Walter H. Wright, dean of the College of Dentistry, spoke on future plans for the dental school.

COLUMBIA TO GIVE GRADUATE DENTAL HYGIENIST COURSES

The School of Dental and Oral Surgery, Columbia University, will offer a program of postgraduate courses for registered dental hygienists June 9-20.

The first course, to be given in the mornings only, will include lectures and demonstrations of newer concepts in mouth examination, x-ray technic, nutrition, materia medica, laboratory technics, instrumentation and office management. The second course, to be offered in the afternoons only, will consist of lectures, demonstrations and field trips in methods and materials in dental health education, child psychology and psychology of human behavior, and clinic management.

All classes are limited. Registration closes June 5. Further information can be obtained from the School of Dental and Oral Surgery, Columbia University, 630 East 168th St., New York 32.

GENERAL NEWS

STERLING V. MEAD ENDORSES U.S. SAVINGS BOND PROGRAM

Sterling V. Mead, president of the American Dental Association, has announced full endorsement of the "Bond-A-Month Plan" of the U.S. Treasury Department.

Through the Bond-A-Month Plan anyone with a personal checking account can buy U.S. Savings Bonds by signing an order to purchase bonds of a certain size at regular intervals.

"Today, dentists as well as other professional persons will find the Bond-A-Month Plan an easy way to invest in their own future and in the country's future," Dr. Mead said.

ELLWOOD DOUGLASS APPOINTED MANAGING EDITOR OF HYGEIA

Mr. Ellwood Douglass, a member of the staff of the St. Louis Post-Dispatch from 1920 to 1942, has been appointed managing editor of *Hygeia*, national health magazine published by the American Medical Association.

Mr. Douglass was science and feature writer for the Chicago Sun immediately before joining the editorial staff of the American Medical Association.

REPORTS OF

COUNCILS AND COMMITTEES

BUREAU OF LIBRARY AND INDEXING SERVICE

REPORTS ON INDEX TO DENTAL LITERATURE

It is the assignment of the Index Department of the Bureau of Library and Indexing Service to review the profession's extensive periodical literature. Each year more than 130 publications, approximately 850 issues, come to the department for classification, filing and eventual compilation into the *Index to Dental Literature*.

The Index for 1942-1944, recently off the press, is a straight alphabetical listing, by subject and author, of material pertaining to dentistry published in the English language. Dental journals from all of the possessions of Great Britain as well as those published in the United States are included in the Index. The current volume, the seventeenth in the series, is the second in which the alphabetical listing is employed. Earlier volumes covered periods of five years, but, because of the expansion of the literature, volumes since 1921 cover three years.

Earlier volumes, from the initial issue (1839-1875), now largely of historical value and out of print, through 1939, contain separate subject and author indexes. Classification of subject matter follows a modification of the Dewey Decimal System adopted for dentistry. Material under each numerical classification is grouped by journal, year and title to enable the reader to locate quickly all material on a given subject which appears in a specific publication during the period included in that volume. Directions for the use of this system, as well as an alphabetic index to contents, are to be found in each volume.

With the growth of dental journalism and the increase in the number of publications to be indexed, use of a more simplified form was found advisable, and the present straight alphabetic system of combined subject and author index was developed and adopted.

All dental publications are carefully checked for scientific material, association reports and biographic and obituary notes. Subject classification is based on a list of more than 1,500 headings drawn from dental terminology as it appears in the literature. Since it has not been within the province of the indexer to decide on professional nomenclature, selection of terms is not attempted. Headings represent current usage, and if several terms are customarily employed synonymously, cross references from one term to another or, in many cases, duplicate coverage of material will be found. A complete list of subject headings currently in use is included in a special section of the 1942-1944 Index.

A standard of abbreviations for journal names was adopted after consultation with dental editors and journalists. A list of these abbreviations, together with the full name of the journal, the address and the frequency of publication, appears in the first pages of each volume of the Index.

Both the system of classification and the abbreviations used in the Index are now employed in the annual indexes of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and the *Journal of Oral Surgery*. Familiarity with this plan should enable research workers and writers to locate material with comparative ease and to prepare bibliographies quickly and accurately.

The period between publication dates of the printed volumes is covered by a monthly card service (mimeograph) circulated to dental school libraries throughout the country. Since the volume of material now appearing makes it impossible for this service to supply complete coverage from month to month, it is the aim of the Index Department to list regularly references from periodicals of greatest scientific value and widest circulation. Scientific papers and articles of current interest from other journals are included whenever possible. All dental journals received in the department are indexed in the printed volume. At present 14,000 cards are prepared and distributed each month.—*Martha Ann Mann, Indexer.*

COUNCIL ON DENTAL HEALTH

CONCLUSIONS AND RECOMMENDATIONS OF THE OHIO WORKSHOP

As THE work of the Council on Dental Health of the American Dental Association progresses, it is becoming increasingly apparent that a large share of the responsibility for dental health planning must be assumed by state and local councils on dental health.

Although the Council on Dental Health can make broad decisions on the national aspects of the dental health problem and can make some general recommendations for the organization and operation of community dental health programs, nevertheless the major share of the program planning on a local level must be assumed by the state and community agencies.

In order to provide a mechanism for collaborating more closely with state and component dental societies, the Council on Dental Health currently is assisting state societies in conducting planning conferences based on the workshop principle. Workshops have been successful for a number of years in the educational and civic improvement fields. Although it is true that workshops usually are conducted for a period of one or more weeks, the essential elements of this planning technic have been concentrated into a three day session for the convenience of practicing dentists who probably would be unable to give more time to the project.

The first in the series of workshops was held in Columbus, Ohio, December 6, 7 and 8, 1946, under the joint sponsorship of the Council on Dental Health of the Ohio State Dental Society and the Ohio State Department of Health. In addition to the members of the State Council on Dental Health, twenty-six dentists representing component societies participated. This initial workshop was intended to serve as an experimental program to test the feasibility of this

type of conference in dental health planning and to determine the best methods for the presentation of basic facts, for analyzing the important elements of the dental health problem and for adopting recommendations for a plan of action.

The Ohio workshop resulted in the adoption of conclusions and recommendations which will form the basis for dental health programs in the state in the future. It is important to emphasize that, although the conclusions and recommendations were adopted unanimously by the participants, they nevertheless represent only the opinions of the group in attendance and are subject to adoption, revision or rejection by the Ohio State Dental Society. The following statement is a summary of the conclusions and recommendations.—*Allen O. Gruebbel, Executive Secretary.*

Dental Personnel

It is recognized that during the past fifteen years the supply of dentists in the United States has not kept abreast of public education and demand for dental care. Any dental health program inaugurated on a national, state or local level must take that fact into consideration.

What appears to be a shortage of dentists in some localities is in reality maldistribution of dental personnel. This situation is a serious aspect of the dental man power problem. Not much progress will be made toward a wider distribution of dental care until students are drawn more evenly from all sections of the state. Every effort should be exerted to supply dentists to localities in which dentist-population ratios are out of proportion.

Dental schools should select students on a geographic basis, presuming that graduates will return to their local districts.

Dental societies should endeavor to stimulate the interest of civic and other philanthropic groups in projects to establish scholarships for dental students in districts in which dentist-population ratios are acutely out of proportion. As an additional aid, the Ohio State Dental Society should establish a dental student loan fund.

It is recommended that:

1. The number of dentists should be increased to meet the demand for dental services. If the present demand for dental care continues, the dentist-population ratio should be increased to 1:1,400 in the state of Ohio. This adjustment would increase the number of dentists from 3,800 to approximately 5,000.

2. To supply these additional dentists, the existing facilities for dental education should be expanded.

3. Councils on dental health of the component societies should exert every effort to interest qualified young men and women in the profession of dentistry. The following methods are suggested:

(a) Student-dentist meetings should be arranged.

(b) Contacts should be made through vocational guidance departments of rural high schools.

(c) Investigations should be made of the possibility of establishing scholarships, student loan funds and subsidies.

(d) To assist in carrying out all phases of the program proposed by this workshop group, it is recommended that one year internships in dentistry for children should be established.

(e) In recognition of the fact that the use of ancillary personnel—hygienists, assistants, dental nurses and technicians—increases the amount of service which the dentist is able to render, it is recommended that the members of the profession be encouraged to make maximum use of these aids and that the number of ancillary personnel be increased to meet the demand.

(f) Requirements for training ancillary personnel should be followed in accordance with standards adopted by the Council on Dental Education of the American Dental Association.

Community Dental Health Programs

For a number of years the dental profession has been aware of the dental health needs of the public. This problem cannot be solved by the dental profession alone. Dentists need the assistance of other agencies as well as the services of ancillary personnel. The Division of Dental Hygiene of the Ohio State Department of Health deserves commendation and encouragement for the assistance it has given to the dental profession as well as for the contribution it has made to the health and welfare of the citizens of Ohio. Health agencies and the health professions, however, have only begun to develop the resources which will be necessary to ensure a high level of dental health for every person in Ohio.

The success of dental health programs will depend largely on the initiative of local councils on dental health and on their ability in securing the cooperation of other interested groups. Long range planning to develop community dental health programs should be based on three major objectives: (1) the development of comprehensive education for the dental profession and public, (2) the adoption of restorative and corrective measures and (3) the expansion of dental research.

It is recognized that a comprehensive dental health plan will not be accepted readily, owing to tradition, precedent and attitudes. However, in a changing world, new problems are constantly being encountered; therefore, new methods must be devised for coping with these new problems. It would be unwise to attempt to fit old patterns to new problems; instead, it would be better to create new designs which conform with present day concepts.

Dental Health Education

The following recommendations concerning dental health education are made:

1. The Board of Education should provide dental health education material for use in the schools so that principals, teachers and affiliated groups, such as the parent-teacher association, nurses and health workers, would be more able to carry out classroom instruction.

2. Training courses in dental health education should be provided in teachers' colleges.

3. The local dental societies should institute annual children's dental health day programs in order to aid in the promotion of health education.

4. The newspapers, magazines and radio are effective avenues of disseminating information. The use of pictures, stories, articles, radio lectures, plays and other programs is a means of assisting in the education of the public.

5. Many other agencies such as granges, 4-H clubs, churches, scout organizations and civic, service and social groups should utilize and distribute available published material on the control and prevention of dental caries.

6. Dental health education should be financed by public funds as well as by a substantial contribution of material and money from the American Dental Association. If the American Dental Association is desirous of seeing its members project and operate programs for all communities, the Association should aid these projects within the full limits of its resources. If the Bureau of Public Relations of the American Dental Association fulfills its duty, the funds secured from the sale of dental health educational material should be used by the association for this purpose.

Treatment Services

The following recommendations concerning treatment services are made:

1. Annual examination for all children should be made by an examining team in the schools or by private practitioners. Notices should be sent to the parents, to be followed by suitable reminders to parents of the need for providing children with necessary dental treatment.

2. Restorative, corrective and prophylactic services for underprivileged children, preceded by roentgenographic examinations when possible, can be provided by dentists employed by the boards of education, parent-teacher association and health departments and in private dental offices.

3. Dental treatment should also be made available to underprivileged adults. If the services of dentists can be secured and if funds are available, restorative, corrective and prophylactic service should be provided in private dental offices, clinics and hospitals.

4. In order to assure the success of a comprehensive dental care plan, it is necessary to secure the full cooperation of all interested persons and groups. However, to secure such support the dental profession must take the initiative. No plan will be successful unless it is financed adequately. Although it is recognized that sufficient funds are not now available, allotments for dental health programs may be secured from the following sources: (a) local, state and federal governments, (b) boards of education, (c) welfare groups and agencies, (d) parent-teacher associations, (e) service clubs and social groups and (f) American Dental Association (health education material).

Sixty per cent of the funds should be provided by the state through tax supported sources, and communities should contribute 40 per cent. Every effort should be made to encourage self-reliance on the part of individuals and families. If every person would attempt to provide dental service for himself, the requirements for assistance through public funds obviously would be reduced. Postpayment arrangements should be available to families who find it difficult to budget for dental services.

5. All dental health programs financed or administered wholly or partially by the Ohio State Department of Health or by a local health department should be approved by the council on dental health of the local dental society.

Programs sponsored by any other official or unofficial agencies should be administered by the sponsoring agency, guided by the council on dental health of the local dental society. In order to ensure cooperation between all groups, it is recommended that a coordinating advisory committee, which is composed of representatives of lay groups, be established.

6. Persons receiving dental service at the expense of the community should be selected by applying a formula based on annual income and on the cost of living in the particular community. The criterion for establishing eligibility for service should be approved by the local dental society. In some communities it may be desirable to have children classified by teachers, public health nurses and school nurses. Adults may be classified by public health nurses, social agencies or a community group specifically selected for that purpose.

7. Dental care should be rendered in clinics, private dental offices or mobile units.

Estimated Cost of Services

Out of a total population of 7,000,000 in Ohio, it is estimated that there are 1,500,000 school children. If all

school children are to receive annual dental examinations, it would be necessary to provide approximately ninety examining teams consisting of an examiner and a charting clerk. It is believed that each examining team could make 17,000 examinations each year. Salaries for each team would be at the rate of $3,200 a year ($1,800 for the examiner, $1,250 for the clerk and $150 for incidental supplies).

The total cost of ninety examining teams would be $288,000 for ten months. If the recommendation is followed, which provides that 60 per cent of the cost be provided by the state government and 40 per cent by communities, the state's share would be $172,800 and the cost to the communities would be $115,200. It has been estimated that 30 per cent of the children would fall within the underprivileged group. According to this estimate, 450,000 children in Ohio would be eligible to receive dental treatment. However, past experience has shown that only 50 per cent of underprivileged children usually avail themselves of the services offered. Thus it can be estimated that the patient load would be 225,000 annually. Experience has shown also that each child requires an average of three hours of treatment annually, making a total of 675,000 hours. On the basis of a seven hour day, 96,428 days would be required. It is estimated that there are 229 working days in a year, and on this basis a total of 421 dentist years would be required to perform the necessary dental services.

It is the opinion of this group that the average cost for providing dental services for each child in private dental offices is $21.12 annually; the total cost for services to 225,000 children would therefore be $4,752,000. On the basis of these figures, the potential gross income for each dentist from this service would be approximately $11,000 annually. At the rate of $4 an hour, the clinic cost would be $2,700,000. If the state's share of the expense is 60 per cent, it would be required to contribute $2,851,200. If the communities' contribution is 40 per cent, their share would be $1,900,800. The total cost of the examination and treatment service program would be $5,040,000. Thus the program would cost about 35 cents per capita in Ohio. In order to make this dental service plan available to the public, each of the 3,800 active dentists in the state would need to increase their patient load approximately 100 persons a year.

To facilitate the establishment of community dental health programs, it is further recommended that:

1. Steps should be taken immediately by the State Department of Health to acquire funds to develop the program recommended in this report.

2. A dental health program should be conducted by each society.

3. The parent-teacher association and other groups should be asked to assist in the promotion of this program.

4. The necessary steps should be taken to develop appealing, attractive and entertaining educational material for radio programs, lectures and plays.

5. A publicity director should be employed to guide and keep the program in operation.

6. The Ohio State Dental Society should take steps in cooperation with component dental societies to support the bills in Congress sponsored by the American Dental Association. The state society should also support other state and national legislation which has for its purpose the provision of funds for dental health education, dental treatment and dental research.

7. The Division of Dental Hygiene of the Ohio State Department of Health should develop a pamphlet which will cover comprehensively the important

factors in personal dental hygiene, diet and early dental care.

8. All dental literature and educational material should be evaluated.

Dental Research

It is essential that dental research projects be established within the state. The purpose of these projects should be:

1. To develop methods for reducing the incidence of dental diseases.

2. To study, evaluate and promote projects for controlling dental disease and to find acceptable means for appraising the effectiveness of these measures in the community dental health program.

3. To develop pertinent material for publication with the view of informing the public and the dental profession on matters related to the prevention and control of dental diseases. This material should be assembled and distributed to component societies and to the public through a publicity agent. The research projects should be financed by grants from the government and from foundations.

Responsibility of Local Groups

The following recommendations are made:

1. Each component dental society should have a council on dental health. The organization of component councils is important in order that the activities of all component councils may be coordinated properly with those of the state and national dental organizations and in order that every section of the state may have the benefit of the services which councils can render. It is desirable that each component council on dental health secure the assistance of public spirited citizens to serve as lay advisory members.

2. The "age three plan" should be adopted in all communities. Under this plan a file is kept on all births so that when a child attains the age of 3 years his card will be removed from the file and a notice sent to the family pointing out the necessity for a dental examination. Each component council on dental health should formulate its own plan for the distribution of these cards. The files should be checked every four months to be certain children receive dental examinations and treatment.

3. The school system should be responsible for educating children in matters of dental health. A systematic teacher-training program should be included in all teacher training institutions. For example, Akron University maintains a course in dental health as part of the curriculum of the school of education.

4. A large share of the responsibility in promoting health rests with state and local governments. It is the responsibility of the dental profession to secure the support of these agencies in organizing and maintaining adequate community dental health programs. State and local health agencies should provide mobile units, portable equipment or health centers with facilities and dental personnel to carry out health education activities and treatment services for underprivileged groups.

Experimental and Demonstration Programs

The following recommendations are made:

1. Dentists should: (a) institute oral health instruction, including toothbrushing technics, for all patients; (b) make use of topical applications of sodium fluoride according to accepted standards; (c) prescribe definite dietary procedures, especially those restricting the use of carbohydrates for a specified period; (d) render periodic prophylactic treatment,

and (e) perform all necessary restorative work.

2. Research workers should: (a) continue and expand studies in the use of fluorides, penicillin and vitamin K, and (b) study the possibility of using dibasic ammonium phosphate in mouthwashes and tooth pastes. (Refer to Kesel's investigation.[1])

3. Public health authorities should: (a) continue existing studies on mass application of fluorine in community water supplies, and (b) study the possibility of using dibasic ammonium phosphate in mouthwashes and tooth pastes as a public health measure.

4. Slogans should be developed to counteract misleading advertising. For example, the statement that "sugar is necessary for energy" may be countered by a slogan such as "natural foods sustain energy—promote dental health."

5. Postgraduate training courses in dentistry for children should be established for dentists selected from certain counties. Such training is to be financed by federal grants-in-aid.

6. Laws or regulations should be enacted permitting the excuse of pupils from regularly scheduled classes for the purpose of keeping dental appointments.

7. Special studies should be established on diet control in which the participants agree voluntarily to carbohydrate restrictions for a period of six weeks each year, for a minimum of five years, and results should be tabulated. This study could be conducted in one or more localities by study groups of interested dentists aided by the Division of Dental Hygiene of the State Department of Health.

1. Kesel, R. G.; O'Donnell, J. F.; Kirch, E. R., and Wach, E. C., The Biological Production and Therapeutic Use of Ammonia in the Oral Cavity in Relation to Dental Caries Prevention. *J.A.D.A.* 33:695 (June 1) 1946.

COUNCIL ON DENTAL THERAPEUTICS

REPORT OF THE ANNUAL MEETING OF THE COUNCIL ON DENTAL THERAPEUTICS

EACH year, usually in March or April, the members of the Council on Dental Therapeutics meet in Chicago to discuss developments in the field of therapeutics, to revise and formulate their general policy and to plan for the future. The routine deliberations of the Council are conducted through a monthly confidential mimeographed bulletin which is prepared under the direction of the secretary of the Council and mailed to the members of the Council and to certain consultants and officers of the American Dental Association.

Basic Program

The many aspects of the program of the Council were itemized in advance for the members, who considered them carefully and tentatively approved continuation of the following current activities:

1. Scientific evaluation of dental ther-

apeutic and cosmetic products, of both the acceptable and unacceptable varieties.

2. Annual publication of the book, Accepted Dental Remedies.

3. Publication of informative reports in THE JOURNAL.

4. Distribution of abstracts and reprints of Council publications to editors and others who request them.

5. Distribution of lists of accepted dentifrices, without charge, to dental schools, practicing dentists and health departments.

6. Publication, by the secretary, of occasional articles in professional and lay periodicals.

7. Correspondence which involves answering thousands of inquiries from dentists, physicians and the laity each year.

8. Talks by Council representatives before dental students, dental school faculties, groups of practicing dentists and allied professional groups.

9. Inspection of manufacturing plants in which local anesthetic solutions are prepared.

10. Periodic laboratory examination of all accepted products and many which are not accepted. It was decided by the Council that this activity should be expanded.

11. Encouragement of laboratory and clinical investigations which are essential to the execution of the Council's program, and financial support when funds are needed by the investigator and are available to the Council.

12. Cooperation with distributors of commercial products in bringing products and advertising into conformity with professional standards.

13. Cooperation with the Food and Drug Administration and the Federal Trade Commission in planning trial proceedings and obtaining qualified professional witnesses.

14. Cooperation with the Army, Navy, United States Public Health Service and Veterans Administration in the establishment of therapeutic standards and in the preparation of specifications.

15. Cooperation with the American Medical Association, the American Pharmaceutical Association and other professional and lay groups whose objectives are compatible with those of the American Dental Association.

The basic program was tentatively approved and referred to the Council's Committee on Rules, Scope and Procedure with instructions to submit specific recommendations.

Scientific Evidence

In its consideration of products with a view to possible acceptance, the Council has always required adequate evidence of safety and effectiveness under conditions of dental use. In order that worth-while products may not be excluded from the list of Accepted Dental Remedies, the Council voted that drugs for which adequate evidence of usefulness in the treatment of disease in medical practice exists will be considered for acceptance as useful in the treatment of diseases of similar causation which occur in or about the oral cavity.

Injectable Local Anesthetics

The local anesthetics which are most commonly used by dentists may be grouped into three categories:

1. Conservative dosage forms of procaine and Monocaine Hydrochloride, many of which the Council has accepted.

2. Four per cent solutions of procaine, for which the Council has stated that there is a restricted legitimate use but which apparently are used routinely by many dentists.[1]

3. Mixtures of procaine with other anesthetics, such as tetracaine hydrochloride. The best known of these is Novocain-Pontocaine with Cobefrin.[2]

No preparations in groups two and

1. *J.A.D.A.* 31:278 (February 1) 1944; 32:1031 (August 1) 1945.
2. *J.A.D.A.* 32:494 (April) 1945.

three have been accepted. The consensus was that acceptance of 4 per cent solutions of procaine might be justified provided directions adequate to discourage their routine use were included in the labeling and advertising. No change in the current policy of refusing to accept mixed anesthetic agents for local injection without adequate evidence of improved safety and effectiveness appears to be indicated at this time.

Dentifrices

The search for a dentifrice useful in the reduction or prevention of dental caries continues. Recent developments warrant the hope that such a dentifrice may be developed. However, in view of the numerous occasions in the past when such hopes have been found to be groundless, the attitude of the Council is advisedly conservative.

Detailed consideration was given to the current dentifrice program of the Council. It was recognized that it should be as easy as possible for dentists generally to provide a helpful and professionally sound answer to the common question, "Doctor, what dentifrice shall I use?" For some time, the Council has given lists of accepted dentifrices, suitable for distribution to patients, to those dentists who request such lists. Methods by which wider professional understanding of and cooperation with the dentifrice program might be achieved were discussed. Several methods were selected for trial. It was decided to give wider publicity to the facts about dentifrices and especially to the activities of the Food and Drug Administration and the Federal Trade Commission in the dentifrice field.

Therapeutic Investigations

For many years the Council has made small grants to dental research workers to encourage study of therapeutic problems. It was decided this year that a conference of persons interested in therapeutic research should be called, preferably in conjunction with the annual sessions of the American Association of Dental Schools in Chicago in June of this year. Plans for such a conference are under way and will be made public through the proper channels.

Fluorides

The Council adopted the following statement with regard to topical application of fluorides for prevention of dental caries:

> The evidence is convincing that fluoride solutions properly applied to the teeth are capable of a limited inhibiting effect on tooth decay in children considered collectively. However, the method is associated with many unknown factors, among them being the optimum frequency of administration, optimum strength of solution, local conditions for maximum adsorption and the mode of action by which fluorine so applied exerts its influence. Despite these shortcomings, it appears to offer a way to reduce significantly the incidence of caries with relative safety in a highly susceptible population and is deserving of attention as a public health measure of potential importance. Although the optimum concentration of fluorine is not known, most of the available evidence is associated with multiple application of 2 per cent aqueous sodium fluoride solutions preceded by oral prophylaxis.

The Council reaffirmed its previously expressed opinion that evidence adequate to justify the administration of fluorides in other oral pharmaceutical dosage forms or by inclusion in dentifrices or mouthwashes is lacking.

Election

Thomas J. Hill, of the Institute of Pathology, Western Reserve University, Cleveland, was elected vice-chairman of the Council on Dental Therapeutics.

AMERICAN DENTAL ASSOCIATION

OPPOSES S.140 AND S.712

ON MARCH 18, J. Ben Robinson, representing the American Dental Association, appeared before the Senate Committee on Expenditures in the Executive Departments and presented dentistry's objections to bills S.140 and S.712. Dr. Robinson's statement was prepared by the Committee on Legislation of the American Dental Association.

S.140, introduced by Senators Fulbright and Taft, would create an executive department of the government to be known as the Department of Health, Education and Security. S.712, introduced by Senator Aiken, is a bill to constitute the Federal Security Agency as a Department of Health, Education and Security.

Dr. Robinson stated that the American Dental Association does not favor either bill. It does favor the establishment of a Federal Department of Health, administered by a Secretary of Health, who would be a graduate in medicine and who would become a member of the President's Cabinet. Within the department there should be a Division of Dentistry administered by a First Assistant Secretary, who would be a graduate in dentistry.

Dr. Robinson's statement is as follows:

The American Dental Association, some years ago, officially announced that the health of our nation is of such paramount importance that it demands the establishment of a Federal Department of Health, administered by a Secretary of Health, who would be a graduate in medicine and who would become a member of the President's Cabinet. Within the department there should be a Division of Dentistry administered by a First Assistant Secretary, who would be a graduate in dentistry.

The American Dental Association believes that S.140, "a bill to create an executive department of the Government to be known as the Department of Health, Education and Security" and, certainly, S.712, "a bill to constitute the Federal Security Agency as a Department of Health, Education, and Security," are not in the best interest of the health welfare of the public.

The American Dental Association believes this for the following reasons:

I. The scope of the health services to our nation is tremendous and extremely important and, therefore, there should be a Federal Department devoted entirely to the health interests of our people. Transfer of all the federal health functions and activities, with the exception of those of the armed forces and the Veterans Administration, to such a department would create a rather large organization and would result in greater coordination of our health efforts and less overlapping of functions. It would provide the states with a centralized bureau of health in the federal government with which to transact business rather than requiring them to deal with a number of competing federal agencies. The Secretary of Health would have direct access to the Executive of our government, a factor which becomes extremely important in times of emergencies and major catastrophies.

II. The health functions of the federal government should be administered by a member of the medical profession as it is important that such an administrator thoroughly understands the health problem and has a professional background to guide him. It is essential that he has freedom of action in the management of his department with direct approach at all times to the Executive Department of the government.

The medical profession has a splendid

record of producing capable administrators among its members so that there should be no difficulty in finding personnel for such a position among our 180,000 physicians.

III. The American Dental Association contends that the dental health of our people is one of the major health problems of the nation. Dental disease is universal.

Although dentistry is a part of the over-all health services, it is a separate and distinct profession from that of medicine. It has its own separate educational institutions, its own licensing laws and its own board of examiners. It has its own professional organizations and a separate literature. Notwithstanding their separate and distinct identities, the two professions have always operated closely in all matters of mutual interest affecting the health of the patient.

Dentistry has certain special and peculiar problems of such a nature that only a person with dental education and experience is competent to make the major policy decisions in a Dental Division of the Department of Health. There should be a separate division for dentistry under the administration of dental officers and supported by special appropriations earmarked for dental purposes.

Experience in dental health activities over a long period of time has proved definitely that the dental division in a public health department will function most efficiently when it is administered under the supervision of dentists who have been trained in administrative work.

IV. There are in the present Congress a number of health bills. It would seem advisable that before S.140 and S.712 are submitted to the Senate for serious consideration, all the pending health bills of merit should be reviewed in hearings. The National Health Act of 1947, S.545, is of particular interest to the professions as it is an omnibus health bill touching many phases of the health problem in addition to administration.

In conclusion we desire to emphasize again:

1. If a Department of Health is established, it should be kept distinct and separate from other departments of the federal government.

2. A Department of Health should have a member of the medical profession of administrative ability as Secretary of Health.

3. There should be in the Department of Health a Dental Division, directed by an Assistant Secretary, who would be a dentist with administrative ability.

4. Congressional action on S.140 and S.712 should await the hearings on other meritorious health bills now in Congress.

Dental Examinations.—The problem of giving dental service to children in a public program is always made more difficult by the huge load of work that needs to be done, and, as a rule, with pitifully inadequate facilities. We know that good dental health requires annual—and, much better, semiannual—detailed, careful examination by a dentist, and correction of any lesions found. Inspections by physicians or teachers are no substitute for this. Unquestionably every school should teach children that they need semiannual dental examination and correction, and should support its teaching by making arrangements with dentists and referring children to them.

As to treatment services within the school system, just how to use whatever such services are available has not been answered definitely. Complete coverage of the lower grades has its advocates against those who propose a selective policy of following a limited group throughout its school career. Here, again, the need for public-health research in dentistry is vital. It seems clear, however, that since dental caries is prevalent throughout the United States the time of school dentists should be spent in filling cavities and in protecting the teeth and oral tissues, instead of merely searching for caries, which is obviously present most of the time.—*Leona Baumgartner and George Wheatley, "For Healthier School Children." The Child 11:155, March 1947.*

BOOK REVIEWS

Applied Anatomy of the Head and Neck: For Students and Practitioners of Dentistry. By Harry H. Shapiro, D.M.D. Second edition, revised and reset. 303 pages, with 221 illustrations. Price $10. Philadelphia: J. B. Lippincott Company, 1947.

A careful study of this book reveals unmistakably that the author has undertaken a task far beyond his reach. The obvious weakness of the first edition already proved that the author did not have the broad knowledge of anatomy and its allied fields which is indispensable if an effort to write a textbook is not to end in failure. The author's treatment of descriptive anatomy is poor and that of regional anatomy even poorer, and the book is padded with sections and chapters on practical topics and case records which have no relation to applied anatomy.

Following are random samples of erroneous, confused or meaningless statements from the book:

"When the anterior pillars [of the fauces] contract, the opening between the mouth and the pharynx is constricted. Similar action of the posterior pillars closes the posterior nares." "The incisive foramen . . . is formed by the union of the halves of the maxilla. Lateral canals within this fossa, on each side of the midline (foramina of Stensen), transmit nasopalatine nerves and the terminal branch of the descending palatine artery. In some individuals, additional canals within the fossa (canals of Scarpa) are found in the midline. When present, these also serve as passageways for nasopalatine nerves." "The openings of the incisive canals are located in the floor of each of the nasal fossae. . . . These extend downward opening beneath the mucosa of the hard palate through the incisive foramen. . . . Four additional canals, two on each side of the midline of the nasal floor, also open into the incisive foramen." "The palate bone, a paired L-shaped structure, is located behind and below the nasal cavity." "The pterygopalatine canal . . . is formed by the articulation of the palate bone and the neighboring portion of the pterygoid plate of the sphenoid." "Though the pull of the masseter is more or less at right angles to its bony attachments, the movement of the mandible when the masseter functions is more complex denoting the simultaneous action of other muscles."

"Serous glands (Ebner's glands) are located in the region of the vallate and the foliate papillae. Their thin secretions serve as a medium for conveying substances to neighboring taste buds." "In the maxillary sinus, the branches [posterior superior alveolar nerves] anastomose . . ." "From the cells of the otic, the sphenopalatine and the submaxillary ganglia, sympathetic fibers carry impulses to the adjacent . . . glands." "In the upper vestibule the buccal frenula owe their origin usually to fibers of the caninus muscle immediately below the mucosa; in the lower vestibular space they are produced in great part by triangularis-muscle fibers." "This elevator of the soft palate inserts into the palatal aponeurosis." "When the [pharyngopalatinus] muscle contracts, the soft palate is drawn forward. . . ." "Action of the cilia [in the nasal cavity] propels the flow of mucus toward the pharynx." "When employing local anesthesia, in approaching the [infraorbital] foramen with a syringe needle one should guide the needle inward, upward and laterally. . . ."

"The inferior surface [of the lesser sphenoid wing] is heavier than the superior. . . ." "The [ethmoidal] cells of one side are separated from those of the other by the nasal septum." "The thin vertical portion of the [palate] bone, difficult to visualize, extends upward from its lateral aspect between the posterior floor of nose and orbit." ". . . the ethmoidal bone, difficult to visualize, is arbitrarily divided into horizontal and vertical bony plates and ethmoidal labyrinths which occupy the bodies of the bone." "The movements possible in this [the temporomandibular] joint are many and complicated, and difficult to visualize."

The number of mistakes is not as important as their level, which is almost unbelievably low.

The publication of this book shows a deplorable lack of responsibility of a member of the teaching profession and of a great university. It is not only dangerous for the student who is misled and confused, but it is also bound to damage the prestige of dental schools, dental teachers and the dental profession.—*Harry Sicher.*

Not by Bread Alone. By Vilhjalmur Stefansson. With an introduction by Eugene F. DuBois, M.D., and Earnest A. Hooton, Ph.D. 339 pages. Paper. Index. Price $3.50. New York: Macmillan Company, 1946.

This book is a study of the meat diet, the least understood of the three main diets by which man has lived, the other two being the mixed diet, which is the best known, and the vegetarian diet. Mr. Stefansson attempts to bring out that it is possible for man to live on a meat diet. However, it is pointed out that it is not the red meat alone but also the fat, bone, marrow and various organs of the body of the animal that are important in this diet.

The author expresses the opinion that it was not until agricultural diets came into existence that such diseases as dental caries, scurvy, rickets and other endemic deficiency diseases became a problem in the health of man. Mr. Stefansson and one of his companion explorers volunteered to serve as subjects for one year in tests at Bellevue Hospital in New York in connection with research on effects of an all-meat diet, and at the end of that time they were, to quote the author, "still alive and healthy."

The author further states that "the absence of caries from those who live wholly on meat is definite. . . . Caries has been found in the teeth of mummies in Egypt, Peru, and in our own Southwest. These semiancient peoples were mixed-diet eaters, depending in considerable part on cereals. Their teeth were better than ours, though not so good as those of the Eskimos.

"It appears that if you want a dental law you can approximate it by saying that the most primitive people usually have the best teeth, but that no people of the past or present are known who had complete freedom from tooth decay unless they were hunting, fishing, pastoral in their way of life, and got little or none of their food direct from the vegetable kingdom. You might add that in some cases a highly vegetarian people, while not attaining the 100 per cent perfection of meat eaters, do, nevertheless, have very good teeth as compared to ours.

"It is contended by the Hawaiian Sugar Planters Association Health Research Project that the shift from good to execrable teeth among the mixed-diet Polynesians has been due to a change from the native taro and yam to cereals. I have seen no comments of theirs upon the doubtless great increase of sugar consumption which has been at least as synchronic with the deterioration of Hawaiian teeth as the shift from yams to cereals."—*Allen O. Gruebbel.*

Dental Education Today. By Harlan Hoyt Horner. 420 pages and 41 tables. Price $6. Chicago: University of Chicago Press, 1947.

Dental Education Today by Harlan H. Horner, secretary of the Council on Dental Education of the American Dental Association, is a book everyone interested in dental education will want to study and then keep conveniently at hand as a reference. By borrowing freely from official records, Dr. Horner has compiled an authoritative account of the development of dental education from the establishment of the first dental school to the present, including discussions of the organization and contributions of the various national dental accrediting agencies, consideration of the various auxiliary dental agencies and a prophecy concerning dental education of "tomorrow."

The book is carefully organized, and the material is presented in a thoughtful fashion. Naturally most of the text deals with the activities of the Council on Dental Education since Dr. Horner's appointment on July 1, 1940. During that time the major activities of the Council have centered on a study and an analysis of the various dental schools. After outlining the historical background in dental education, Dr. Horner presents the findings of the Council in its survey (chap. 3). Brief sketches also are given of the physical facilities of various dental schools, their financial management and support and a wide variety of other items of general interest. The book is well indexed and will be valuable as a reference book for educators, dentists, students and laymen. In fact, the collection of official documents in the appendix justifies the publication of the book; the inclusion of the interpretations and opinions of the Council and of Dr. Horner makes the book invaluable.

Dr. Horner presents discussions of many controversial issues in dental education from the point of view of the Council on Dental Education. For example, he describes the dangers of individual states setting up their

own educational requirements for dental students, citing the situation in the state of New York, where graduates of any one of seven outstanding dental schools are not admitted to the dental licensing examination of New York. Although it is true that each state must protect the right to examine those who desire to qualify for a license to practice in that state, one can readily understand the chaos that would exist if every state would insist on setting up its own standard of educational requirements. Obviously accrediting should be done on a national basis. Dr. Horner presents a concise analysis of the good influence of the Board of Regents of the State of New York in dental education (p. 197), but he ably defends the Council's permissive regulation with reference to biology and physics (which the Board of Regents disproves). He states that the organization of a curriculum in a dental school should be flexible and should be based on the appreciation of dentistry as a growing and expanding science (p. 237).

The author considers so fully the dangers of too much of the "accrediting process" in education and presents such strong arguments against it (p. 293) that he has almost convinced this reviewer that the accrediting system in dental education should be relaxed. Many dental educators believe that dentistry will suffer if too rigid controls are maintained over dental education.

A detailed report of the Council's action involving Columbia University is presented on pages 64-68. The author carefully defends the action of the Council and at the same time presents Columbia's point of view: "The Columbia authorities express the hope that the new plan will actually strengthen their dental educational program. Their honesty and sincerity of purpose will hardly be questioned. There must be an attainable middle ground of mutual respect and confidence between the profession and the university. It is highly desirable that it be found and acted upon" (p. 60). Dr. Horner states further that "the dental profession is proud to have such an institution as Columbia University engaged in the education and training of dentists and not unappreciative of the contributions it has made to this cause in the past" (p. 68). However, Dr. Horner points out that realism enters into this situation and "while subscribing to the high ideals voiced by President Butler (of Columbia University) the dental profession is deeply apprehensive that the ends he visualizes will not be attained under the type of administration Columbia has adopted" (p. 67).

Dr. Horner pays tribute to the influence of William J. Gies and other educators in forming policies of dental education. Dr. Gies is cited as being "conscientiously and wholeheartedly devoted to the cause of dental education, to which he has . . . rendered continuously outstanding service" (p. 155).

Dr. Horner, though not himself a dentist, has a good understanding of dental education, and his critical comments are worthy of much study and consideration. For example, he points out that half of the dental schools derive more than 80 per cent of their income from students and patients, and in the light of what the public needs from dentistry this situation is "tragic." "The paramount problem in dental education has been for twenty years and is today the securing of adequate support from society to train dentists effectively to do what society insistently asks of them" (p. 164).

The author concludes his analysis of the status of dental education on an optimistic note. He is convinced that dental education is now firmly oriented in the universities where it belongs and that society through public funds and private trusts will meet its obligation satisfactorily. "Serious and commanding as many of the problems are which confront the dental school of tomorrow, they are solvable within the present framework of dental education" (p. 318).

There are some who will disagree with minor details presented in this book, but every unbiased reader will recognize it to be a valuable contribution to dental education and organized dentistry. Dr. Horner is to be commended for collecting and organizing this valuable material.—*M. K. Hine.*

CURRENT LITERATURE

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Physiologic Pigmentation of the Oral and Cutaneous Tissues in the Negro. Clifton O. Dummett.

Pigmentation of oral and cutaneous tissues is often considered an important diagnostic factor in pathologic conditions. However, pigmentation of these tissues also occurs in persons who on thorough examination show no associated pathologic changes. This is especially true of Negroes, although physiologic pigmentation is not limited to any one race. It has been reported in many Caucasians.

About 600 Negroes of varying shades of complexion were examined to find the relation of oral to cutaneous pigmentation. The gingivae, buccal mucous membranes, tongue, hard palate and lips were examined, and observations were made of the type, character and region of pigmentation. The general complexion of the skin in the lower half of the face (from the tip and base of the nose to the mentum) was used as a basis of comparison with the color of the oral tissues. Because of the wide variation in skin color of Negroes, it was decided to use four complexion classifications (very dark, brown, light brown and fair) and to exclude those persons in whom a possible conflict in determination of color might occur.

In the persons examined, gingival tissue pigmentation was directly proportional to skin pigmentation in a large majority of cases; that is, those Negroes of very dark and brown complexions showed considerable oral pigmentation while Negroes of light brown and fair complexions showed much less pigmentation. However, the number of cases of very dark Negroes with no clinical evidences of pigmentation was large enough to cause the author to question the unvarying constancy of association between oral and cutaneous pigmentation.

The Relation of Penicillin to Induced Rat Dental Caries and Oral L. Acidophilus. F. J. McClure and W. L. Hewitt.

Experimental white rats, matched with litter-mate controls, received a corn meal caries-inducing diet containing 75 units of penicillin per gram and drank water containing 75 units of penicillin per milliliter. Fifty per cent of the control rats which received no

penicillin developed macroscopic caries whereas none of the rats given penicillin had caries. Oral Lactobacillus acidophilus counts of rats receiving penicillin were mostly negative, as contrasted with control rats which averaged fifty or more plate colonies of organisms per rat. The results suggest that human dental caries may respond to penicillin therapy.

A Study of the Syrian Hamster, Its Molars, and Their Lesions. Frank J. Orland.

It has been pointed out by investigators in the past few years that dental lesions are common in the molars of hamsters (Cricetus auratus) fed diets containing large amounts of soft or finely ground carbohydrate and no coarse particles such as apparently are essential for caries production in the molar of the albino rat. This significant finding has led to the study of experimental dental caries in hamsters in the absence of the fracture factor which complicated the studies in the albino rat.

In the present study the Syrian hamster is described as to its phylogenetic relation and anatomic characteristics pertaining to its dentition. The calcification, eruption and morphology of the molar dentition is described and discussed. Distribution of the carious lesions indicated that the males were somewhat more susceptible than the females; that the caries index in the maxillary molars was 20 per cent greater than that in the mandibular molars; that there was no significant difference between the caries index in right and left molars, and that third molars were involved most frequently and second molars the least frequently.

The Oral Bacterial Flora as Related to Dental Caries in the Syrian Hamster. Frank J. Orland.

Since a relation has been demonstrated between certain oral bacteria and dental caries in man and in the albino rat and because the molar lesions produced in the hamster have been found to be similar to dental caries in man, a preliminary investigation of the oral bacterial flora of the hamster (Cricetus auratus) was undertaken. Specimens of the oral flora, obtained from the surfaces of the molars by means of a small aspirating tube, were grown on an enriched, differential medium having a pH of 5.0. Bacterial colonies on a total of 227 such acid agar plates inoculated with perimolar specimens from 179 hamsters maintained on various diets were observed and studied. Aciduric micro-organisms isolated were staphylococci, streptococci, unidentified pleomorphic organisms and five varieties of lactobacilli.

Comparison of caries indexes with the numbers of bacteria isolated indicated some degree of association of lactobacilli and streptococci with the development of carious lesions. There was no clear evidence of a direct relation between the number of micro-organisms isolated and the vitamin content of the various diets.

Saliva Incubated with Glucose as a Replacement for Tryptophane in a Synthetic Medium Supporting the Production of Acid by Lactobacillus Acidophilus. David Weisberger.

When human saliva is incubated with glucose for twenty-four hours or more, it can be substituted for the amino acid tryptophan in a synthetic medium used to promote the growth of an oral strain of Lactobacillus acidophilus. An aliquot of the same pooled saliva when incubated without glucose does not support maximum growth of the test organism. When saliva incubated with glucose was used as a substitute for casein hydrolyzate in the synthetic medium, growth of the test organism occurred but this growth was only about one-fifth that obtained when casein hydrolyzate was used. This finding suggests that glucose added to incubating saliva makes available some of the amino acids found necessary for the growth of the test organism.

Changes of "Carboxyl-CO_2" and of Ammonia-Plus-Urea Nitrogen in Saliva Incubated with Glucose. David Weisberger.

In the study of proteolysis occurring in incubating saliva, the effect of the addition of glucose was determined by estimating the amino acids set free, both the ninhydrin-carbon dioxide reaction and the nitrous acid method being used. The effect of the addition of glucose to incubating saliva was to increase markedly the free carboxyl and primary amino acid groups as incubation progressed. When ammonia-plus-urea nitrogen changes were studied, it was observed that addition of glucose to incubating saliva favors the process of proteolysis over that of deamination.

Arginine-Arginase Relationship in Regeneration, Repair and Development of Neoplasms. Wesley G. Irons.

A series of experiments is under way to investigate the arginine-arginase relation with reference to the metabolism of the body. Such a relation seems to be indicated by results of studies of the action of arginine and arginase in guinea pigs and mice and on cells of tissue cultures. Accumulation of evidence indicates that there may be a definite role played by an arginine-arginase combination in the control of regeneration and repair. Also, arginine plus the nucleic acid of the cells may form the nucleus for the autonomous development exhibited by malignant neoplasms. Arginine must be furnished, at least in part, by food intake; therefore nutritional disturbances may be considered as one source of such an enzyme-substrate unbalance. It has been found that the production of liver arginase is under the influence of the endocrine system.

The Supporting Tissues of the Tooth in Acute Secondary Agranulocytosis (Arsphenamin Neutropenia). William H. Bauer.

The present investigation attempts to answer the question why, in many cases of acute secondary agranulocytosis, the first noticeable lesions appear on the marginal gingiva. The author studied microscopically the jaws of three patients with agranulocytosis resulting from administration of arsphenamine in antisyphilitic treatment. Two patients died within a few days and the third one after sixty days. The microscopic examination showed that the necrosis starts in the gingiva bordering the deepened dental crevice. The absence of phagocytic granulocytes permits the micro-organisms always present in these crevices to act on the adjacent soft tissue and to cause its necrosis. These processes progress into and destroy the periodontal membrane and the adjacent bone. The presence of micro-organisms in the crypts of the tonsils, the folds of the mucosa of the pharynx and other organs easily explains the early occurrence of gangrenous lesions in these organs.

Rachitic Changes of the Mandibular Condyle of the Rat. Joseph P. Weinmann.

The investigation of the rachitic changes of the mandibular condyle is based on 14 white rats kept on a Steenbock and Black rachitogenic diet for seven weeks after weaning and on litter-mates of the same age kept on a balanced diet. The rachitic changes of the condyle were found analogous to the rachitic changes in the epiphyseal plate. The growth cartilage in the condyle is increased in thickness and the condyle itself is club-shaped. Both phenomena are interpreted as the consequence of lack of calcification of the cartilage and the osteoid tissue, and their consecutive resistance to resorption.

Comparative Alveolar Pathology in Sheep and Goats. Samuel Rabkin.

The purpose of this inquiry was to make a comparative study of pathologic changes in the jaw bone of the human being and the sheep. It is well known that nothing prevailed in the history of primitive man or lower mammal to indicate a tendency toward profound deterioration of the alveolar support of the teeth such as exists in civilized man. It appeared that the domestic sheep, long removed from the need of struggle for existence, requiring natural and human protection and wholly dependent on restricted adaptation of environment and food habits, ought to provide corollary information. The food habit that places a limited demand on the masticatory system, as is the case with the sheep, should reveal the functional effect on bone structure.

Thirty-six heads of freshly slaughtered sheep and three of goats were used for this study, ranging in age from 6 months to an estimated 12 to 14 years; however, the middle and late adult was the objective of this study. This limited study of the jaw bones of the sheep revealed degenerative age changes having no counterparts in the process of senile changes of the human skeleton and, perhaps, not in other mammals. The human mandible in old age loses its proportional dimensions, owing primarily to the loss of the alveolar process as well as to further wasting of the mandibular body. In the sheep it was found that no appreciable shrinkage of the alveolar process occurs in spite of the loss of alveolar bone and the looseness of the teeth. Instead, the inner structure continually resorbs, until a mere shell of bone remains; lost bone is replaced by fat.

Results obtained from the goats were disappointing, owing to the meager amount of material available. Also, it was discovered

that the cranium could be cut with a bone band saw but the crowns of the teeth could not. Dulling and breaking of ordinary bone saw blades (the type used for bone and human teeth) on goats' teeth precluded further experiment. However, the following evidence was obtained: (1) the bone of the entire skull, particularly the jaws, is massive, dense and heavy; (2) the teeth appear highly mineralized; the cusps are sharp, with worn surfaces of enamel having a more distinct luster than is observable in teeth of sheep or human beings.

The jaws of sheep show changes with age that are far different from those in the jaws of man. The alveolar processes of sheep show no appreciable reduction in spite of looseness of the teeth and loss of supporting bone. Goat jaws appear to be extremely dense and heavy with highly mineralized teeth.

Effect of Iron Deficiency in Rats on Incisor Pigmentation. E. V. Pindborg, J. J. Pindborg and C. M. Plum. Acta pharmacol. & toxicol. 2:285, 1946.

Additional evidence is presented that the pigment in the incisors of rodents contains iron. Three rats were depleted of iron by periodic bloodletting throughout the course of the experiments. A decrease in the iron content of the whole incisor was observed after such treatment. The pigment of the incisors was not altered or was altered only slightly after bloodletting. In three rats similarly treated and fed iron supplements in the food the addition of iron diminished the decrease of iron in the teeth.—*J. E. Gilda.*

Fluorine and Dental Caries in India. K. L. Shourie. Indian J. M. Research 34:97, May 1946.

The correlation between the incidence of dental caries and mottled enamel and the fluorine content of drinking water has been studied in various parts of India. A positive degree of correlation between the incidence of mottled enamel and the fluorine content of drinking water was observed. This correlation was found to be statistically significant. Statistical analysis showed that the degree of severity of mottled enamel was correlated with a higher concentration of fluorine. A lower incidence of dental decay was recorded in 1,765 children showing mottled enamel as compared with 4,312 children showing no mottled enamel. The severity of mottled enamel had no influence on the incidence of caries. In a group of 1,074 healthy adults, who were not living throughout their life in an endemic fluorosis area, no association between the incidence of dental caries and mottled enamel was elicited.—*Hyman Goldberg.*

Eruption Age of Teeth in India. K. L. Shourie. Indian J. M. Research 34:105, May 1946.

An attempt has been made to estimate the eruption age of teeth in certain Indian populations. From the data collected in North and South India estimates have been provided for the eruption age of each tooth. The differences noted between the eruption ages of boys and girls are not great; those between boys of South and North India are small. Estimates seem to indicate that in India the eruption of teeth takes place somewhat earlier than in the United States.—*Hyman Goldberg.*

The Relationship of the Parathyroid Glands to the Action of Estrogen on Bone. Burton L. Baker and Joseph H. Leek. Am. J. Physiol. 147:522, 1946.

Fifty-two growing female rats of the Long-Evans strain, ranging from 32 to 90 days of age, were divided into the following four groups: nonoperated, oil-treated; nonoperated, estrogen-treated; parathyroidectomized, oil-treated, and parathyroidectomized, estrogen-treated. At autopsy the tibias were weighed and the proximal ends prepared for histologic study. The thickness of the epiphyseal cartilage was determined by taking the mean of three measurements, one at the middle and the others midway from the middle to either side of the epiphyseal cartilage.

The results showed that estradiol was about equally effective in both intact and parathyroidectomized rats in inhibiting the proliferative activity of the epiphyseal cartilage and in inducing increased subepiphyseal trabeculation. It is postulated that estrogen brings about these results by other than the stimulation of the parathyroid glands. Even though the hypophysis is necessary for this phenomenon of "hyperossification," the parathyroids are not and, therefore, the secretion of a parathyrotropic factor by the hypophysis need not be postulated.—*S. W. Leung.*

LIST OF DENTAL OFFICERS

SEPARATED FROM ARMY DENTAL CORPS

THE following list of dental officers separated from the Army Dental Corps does not include rank because such information is no longer furnished by the Surgeon General's Office. Publication will be given to other names as soon as possible.

Alabama	
Ashford	Parrish, William T.
Birmingham	Huffstutler, Paul R.
Clanton	Gowan, Joe E.
Arizona	
Flagstaff	Paris, Lawrence
Arkansas	
Jonesboro	Johnston, Leonard S., Jr.
Lonoke	Smith, Earl S.
Connecticut	
Hartford	Coroso, Louis F.
Hartford	Goldberg, Solomon
New Britain	Dunn, Albert J.
New Haven	Alpert, Zelly C.
New Haven	Egalka, Morris
Norwich	Goldblatt, Maurice
Thompsonville	Norian, Henry K.
West Haven	Serow, Arnold H.
Delaware	
Smyrna	Jones, Ralph B.
District of Columbia	
Washington	Harper, Robert M.
Washington	Hohouser, Henry S.
Washington	Perry, Frederick S.
Hawaii	
Hilo	Goo, Charles A.
Idaho	
Kimberly	Alban, Arthur L.
Iowa	
Cedar Rapids	Jecmenek, Jerome J.
Council Bluffs	Green, Russell E.
Grinnell	Hoefert, Kermit L.
Nashua	Hanson, Cyrus K.
Kansas	
Winfield	Hetherington, Marion L.
Kentucky	
Earlington	Hardin, James W., Jr.
Flemingsburg	Hall, John L.
Louisville	Hafner, Earl K.
Louisiana	
Houma	Jaccuzzo, James V.
Milton	Hebert, Charles L.
Shreveport	Hardin, John R.
Maryland	
Baltimore	Brotman, Irwin N.
Baltimore	Cooper, David
Baltimore	Hoffman, Emanuel
Baltimore	Orman, Herbert
Hagerstown	Grove, Harry C.
Towson	Machen, August R.
Minnesota	
Caledonia	Kurz, Clarence B.
Minneapolis	Johnson, Raymond F. D.
Rochester	Lyon, Eugene D.
St. Paul	Hoivik, Tony H.
Missouri	
Brentwood	Tison, William M.
Carthage	Gibson, Clifford A.
Hannibal	Greene, Donald W.
Kansas City	Jones, Samuel M.
St. Louis	Jasper, Lester H.
Warrensburg	Johnson, James Y.
Montana	
Great Falls	Gutchell, Glenn C.
Nebraska	
Alliance	Gibson, Clarence M.
Atkinson	Hesse, Clarence J.
Lincoln	Tullis, Byron W.
Omaha	Henderson, Charles D.
New Hampshire	
Manchester	Goodman, Harold H.
Nashua	Corosa, Julius
North Carolina	
Greensboro	Wolfe, Carl B.
High Point	Hunsucker, Hugh M.
Snow Hill	Henson, James L.
Winston-Salem	Crotts, Hylton K.
North Dakota	
Milnor	Norwood, Lyle A.
Oklahoma	
Ada	Hudson, Trueman A.
Pawnee	Goff, Lewis N.
South Carolina	
Bennettsville	Goldberg, Edward H., Jr.
Charleston	Gretenstein, Lester

Florence	Nickles, George K.
Greer	Hodgson, Ralph G.
Tennessee	
Bristol	Hyder, Jack W.
Clarksville	Gholson, John A., Jr.
Texas	
Amarillo	Gibbon, William E.
Dallas	McCaskill, William C.
Houston	Flowers, Edward L., Jr.
Houston	Foltz, Ralph A.
Houston	Hall, Murray M.
Houston	Hamblen, Tolar N., Jr.
Port Arthur	Painton, Mark J., Jr.
Utah	
St. George	Hutchings, Myles O.
Salt Lake City	Glade, Frederick R.
Virginia	
Fredericksburg	Holcomb, Raymond A.
Norfolk	Lichtenstein, Joseph M.
Richmond	Jones, Daniel M., Jr.
Staunton	Griffith, Harold C.
Washington	
Seattle	Jones, Thomas J.
Seattle	Jorgensen, Stanley K.
Spokane	Grady, Robert E.

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

The following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Arkansas		
Batesville	Grammer, William N.	Lieut.
Pine Bluff	White, Warren A.	Lieut.
California		
Burbank	Reiersen, Thomas M.	Lieut.
Glendale	McIlwain, William J.	Lieut.
San Francisco	Gilman, Vernon L.	Lieut.
Santa Rosa	Ayers, Myron J.	Lieut.
Florida		
Jacksonville	Nagel, LeRoy B.	Cmdr.
Illinois		
Rockford	Kaplan, William	Lieut.
Iowa		
Muscatine	Wagner, John A.	Lieut.
Kansas		
Topeka	Buechner, F. W. E.	Cmdr.
Massachusetts		
Medford	Cangiano, Albert E.	Lieut.
North Adams	Bianco, Norman V.	Lieut.
Roxbury	Thomas, Adeeb E.	Lieut.
New Jersey		
Long Branch	Reisner, Leon, Jr.	Lieut.
Norwood	Sweeney, Myles F. P.	Lieut.
New York		
Bronx	Cherico, Louis J.	Lieut.
Bronx	Lemberger, Albert	Lieut.
Brooklyn	Blinderman, Joseph J.	Lieut.
Brooklyn	Pasamanick, Fred	Lieut.
Haverstraw	Rubin, Marvin V.	Lieut.
Lakewood	Wagner, Victor R., Jr.	Lieut.
New York	Abelson, Jacob	Lieut.
New York	Bylicky, Henry S.	Lieut.
New York	Fisch, Joseph	Lieut.
New York	Hoffman, Seymour	Lieut.
New York	Horowitz, Mervin B.	Lieut.
Syracuse	Kennedy, David J.	Cmdr.
North Carolina		
Forest City	Morris, Ernest C.	Lieut.
Newton	Cochran, James D.	Lieut.
Ohio		
Cincinnati	Broughton, John H.	Lieut.
Goshen	Hause, Aaron W.	Lieut.
Oklahoma		
Heavener	Spyres, Ray M.	Lieut.
Henryetta	Reynolds, G. E., Jr.	Lieut.
Pennsylvania		
Philadelphia	McAfee, James S., Jr.	Lieut.
Texas		
Nacogdoches	Wallace, Curtis O.	Cmdr.
Virginia		
Suffolk	March, Lloyd C., Jr.	Lieut.
Suffolk	Rose, Gerald J.	Lieut.
Washington		
Pe Ell	Forsyth, Arthur H., Jr.	Lieut.

DEATHS

Abell, Burt, St. Cloud, Fla.; College of Dental Surgery, University of Michigan, 1892; died April 7; aged 82.

Allen, Robert M., Freeport, N. Y.; died March 30; aged 50.

Anderson, Otis C., Macon, Ga.; Atlanta Dental College, 1911; died March 31.

Asbury, Jesse M., Oklahoma City, Okla.; Western Dental College, 1909; died March 16; aged 62.

Backus, Wesley M., Buffalo; School of Dentistry, University of Buffalo, 1904; died April 7; aged 70.

Baker, Harry J., Williston, Minn.; College of Dentistry, University of Minnesota, 1906; died February 21; aged 66.

Banta, Henry W., Englewood, N. J.; New York College of Dentistry, 1902; died March 2; aged 68.

Beard, Adelbert W., Newark, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1898; died April 5; aged 84.

Beemer, G. N., Mason City, Iowa; Baltimore College of Dental Surgery, 1890; died March 2; aged 80.

Belsan, James C., Chicago; died April 9; aged 47.

Biddison, George F., Rock Island, Ill.; died March 16; aged 54.

Bitzer, James H., Charleston, W. Va.; Baltimore College of Dental Surgery, 1887; died March 11; aged 84.

Brecheisen, Arthur A., Wellsville, Kan.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1905; died February 8; aged 66.

Brown, John H., Newton, Miss.; School of Dentistry, Vanderbilt University, 1901; died March 4; aged 68.

Bruyette, Leo T., Simsbury, Conn.; Baltimore College of Dental Surgery, 1918; died March 6; aged 53.

Butler, George N., Riverdale, Md.; died March 22.

Cannan, James R., Wapakoneta, Ohio; College of Dental Surgery, University of Michigan, 1902; died March 16; aged 74.

Carlisle, Fred B., Los Angeles; College of Dentistry, University of Southern California, 1919; died April 11; aged 56.

Carlson, Seth R., White Plains, N. Y.; died February 25; aged 48.

Castell, Francis C., Pontiac, Mich.; College of Dental Surgery, University of Michigan, 1898; died March 2; aged 72.

Chapman, Alonzo B., Indianapolis; died April 10; aged 76.

Clinton, Keenan C., Memphis, Tenn.; College of Dentistry, University of Tennessee, 1934; died February 23; aged 35.

Cohen, A. K., Brainerd, Minn.; Dental School, Harvard University, 1913; died March 16; aged 61.

Cole, A. Eugene, Toledo, Ohio; Ohio Medical University, 1897; died April 20; aged 78.

Connery, J. Alfred, Jr., Saginaw, Mich.; College of Dental Surgery, University of Michigan, 1908; died February 22; aged 62.

Covell, George M., Rock Island, Ill.; Keokuk Dental College, 1905; died February 27; aged 65.

Cowart, Alva L., Tampa, Fla.; Atlanta Dental College, 1915; died March 30; aged 60.

Crowell, William C., Maysville, Ky.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1911; died February 28; aged 55.

Davis, John E., Hathaway Pines, Calif.; died March 1; aged 48.

Davis, William W., Muskegon, Mich.; College of Dental Surgery, University of Michigan, 1915; died March 7; aged 69.

Dean, James H., Greenwood, Ind.; School of Dentistry, Indiana University, 1898; died March 25; aged 69.

Demko, Fred, St. Louis; School of Dentistry, St. Louis University, 1897; died March 16; aged 72.

Dillard, J. P., Charleston, Ill.; died February 15; aged 78.

Dix, Edgar, Los Angeles; died in February; aged 76.

Doherty, Thomas A., Lynn, Mass.; Tufts College Dental School, 1918; died February 28; aged 59.

Driscoll, Owen E., Charlottesville, Va.; University College of Medicine, Dental Department, Richmond, 1898; died March 7; aged 76.

Ebersole, Robert R., Muskogee, Okla., died February 19; aged 40.

Ellis, Gideon C., Maquoketa, Iowa; College of Dentistry, State University of Iowa, 1903; died March 4; aged 65.

Engstrom, Charles J. R., Beverly Hills, Calif.; died March 5; aged 66.

Esser, Ben J., Perham, Minn.; College of Dentistry, University of Iowa, 1913; died February 22; aged 61.

Fallon, John F., West Roxbury, Mass.; died March 18; aged 42.

Fanslowe, William F., New Haven, Conn.; College of Dental and Oral Surgery of New York, 1911; died March 6.

Feigel, Phillip R., Louisville, Ky.; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1892; died April 6; aged 78.

Fodor, Julius S., Shelbyville, Ind.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1916; died March 23; aged 57.

Foster, O. F., Sullivan, Ill.; Dental School, Northwestern University, 1907; died February 26; aged 62.

Frackelton, Albert, Milwaukee; School of Dentistry, Marquette University, 1907; died March 18; aged 72.

Frazee, David L., Carthage, Ill.; Columbian Dental College, 1898; died April 11; aged 72.

Gaffney, James A., Irondequoit, N. Y.; College of Dental Surgery, University of Michigan, 1916; died March 13; aged 51.

Games, Jennie H., North Bend, Ohio; Ohio Dental College, 1895; died March 26; aged 73.

Gibson, Charles S., Augusta, Ga.; died March 15; aged 61.

Gilbertson, Oscar, Chicago; Dental School, Northwestern University, 1917; died March 12; aged 61.

Gleeson, John F., Louisville, Ky.; School of Dentistry, University of Louisville, 1926; died April 10; aged 42.

Glick, Jesse, Brooklyn; died April 17; aged 39.

Goddard, Frederick R., New York; New York College of Dentistry, 1894; died April 28; aged 76.

Goode, Gladstone, New York; School of Dentistry, University of Buffalo, 1899; died March 18; aged 72.

Gordon, Henrietta, Tipton, Iowa; died March 21; aged 70.

Goudy, Donald S., Los Angeles; died April 17; aged 41.

Graeber, Nicholas J., Philadelphia; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1896; died April 2; aged 70.

Graham, George G., Memphis, Tenn.; College of Dentistry, University of Tennessee, 1923; died March 1; aged 48.

Green, Harry B., Mt. Sterling, Ky.; School of Dentistry, University of Louisville, 1904; died March 20; aged 70.

Haedge, Carl, St. Paul; College of Dentistry, University of Minnesota, 1916; died March 25; aged 54.

Halperin, Irving M., Teaneck, N. J.; died February 23; aged 41.

Hardesty, George N., Berryville, Va.; died March 28; aged 70.

Helgeson, H. O., Marinette, Wis.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1920; died March 12; aged 51.

Hill, William J., Stone, Ky.; died March 9; aged 51.

Holden, George M., Hackettstown, N. J.; Dental School, Harvard University, 1891; died March 28; aged 77.

Honey, Edgar A., Sr., Kalamazoo, Mich.; College of Dental Surgery, University of Michigan, 1890; died in April; aged 79.

Hull, John R., Seattle; Western Dental College, 1903; died April 13; aged 68.

Hutton, Frank G., Ypsilanti, Mich.; School of Dentistry, Indiana University, 1901; died March 22; aged 68.

Jacobson, Benjamin, Arlington, N. J.; New York College of Dentistry, 1891; died March 27; aged 77.

Kennedy, William E., Dayton, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati, 1899; died March 18; aged 70.

Knauer, Frederick, Long Island, N. Y.; New York College of Dentistry, 1921; died March 7; aged 47.

Lehman, Harry L., Doylestown, Pa.; Medico-Chirurgical College of Philadelphia, 1911; died February 24; aged 60.

Lesher, C. D., Los Angeles; Denver College of Dentistry, Dental Department of the University of Denver, 1900; died February 18.

Lewis, George E., Salem, Ore.; School of Dentistry, North Pacific College of Oregon, 1924; died March 4; aged 51.

Lincoln, Benjamin A., Philadelphia; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1918; died February 25; aged 51.

Lockwood, Lester D., Milford, Conn.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1905; died February 1; aged 65.

Long, H. H., Berwick, Pa.; School of Dentistry, Temple University, 1905; died March 11; aged 67.

Long, John R., Pottstown, Pa.; Pennsylvania College of Dental Surgery, 1901; died March 14; aged 60.

Loomis, Clifford C., Chicago; College of Dentistry, University of Illinois, 1919; died April 6; aged 52.

Lowe, Clarence H., Robinson, Ill.; died February 26; aged 63.

Lytes, Frederick P., Pine Bluff, Ark.; Meharry Dental College, 1906; died March 3.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois
WHItehall 6730 Cable Address: ADAECO
Lon W. Morrey, Editor **John J. Hollister, Business Manager**

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Arkansas			I. M. Sternberg	Merchants Bank Bldg., Ft. Smith
California			L. E. Linehan	450 Sutter St., San Francisco
S. California	Sept. 15–17	Los Angeles	M. E. Ralston	903 Crenshaw Blvd., Los Angeles 6
Colorado			R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	June 3-5	New London	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. Krygier	309 S. State St., Dover
D. of Columbia	June 10	Washington	K. H. Wood	202-1835 Eye St., N.W., Washington
Florida	Nov. 10–12	St. Petersburg	J. I. Todd	433 St. James Bldg., Jacksonville
Georgia	Oct. 19–22	Atlanta	J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	October	Honolulu	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho	June 9–11	Sun Valley	H. F. Miller	Moscow
Illinois	Oct. 9–11	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana			E. E. Ewbank	Kingman
Iowa			A. N. Hunniston	417 Higley Bldg., Cedar Rapids
Kansas			F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky			J. L. Walker	640 Barbee Way, S., Louisville
Louisiana			J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 5–7	Poland Spring	A. H. Garcelon	State House, Augusta
Maryland			J. H. Shackelford	706 Baltimore Life Bldg., Baltimore 1
Massachusetts			P. E. Adams	106 Marlborough St., Boston
Michigan			F. Wertheimer	Michigan Department of Health, Lansing
Minnesota	Feb. 23–25, 1948	St. Paul	L. M. Cruttenden	Lowry Medical Arts Bldg., St. Paul
Mississippi	June 1–4	Biloxi	O. L. Colee	Magnolia
Missouri			C. W. Digges	Exchange National Bank Bldg., Columbia
Montana			C. S. Renouard	305 Phoenix Bldg., Butte
Nebraska			F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada			L. G. Jacob	505 Chestnut St., Reno
New Hampshire	June 15–17	Portsmouth	F. E. Williams	814 Elm St., Manchester
New Jersey			J. G. Carr	407 Cooper St., Camden
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North Carolina			C. W. Sanders	Benson
North Dakota			K. G. Allen	Fargo
Ohio	Nov. 9–12	Cleveland	E. G. Jones	185 E. State St., Columbus
Oklahoma			E. W. Wise	Medical Arts Bldg., Tulsa
Oregon	June 5–7	Portland	W. H. Hurley	922 Selling Bldg., Portland 5
Panama Canal Z.			T. W. Cagle	Box 243, Cocoli
Pennsylvania			E. R. Aston	421 Market St., Kingston
Philippine I.			G. A. Carreon	9 Broadway, Third St., N. Manila
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Rhode Island			M. B. Messore	707 Union Trust Bldg., Providence
South Carolina			J. R. Owings	Greenville
South Dakota			E. W. Elmen	Sioux Falls
Tennessee			E. J. Justis	Exchange Bldg., Memphis
Texas			W. Ogle	313 Medical Arts Bldg., Dallas
Utah	June 5–7	Ogden	S. Ballinger	401 Medical Arts Bldg., Salt Lake City
Vermont			J. A. Larrow	Middlebury
Virginia			J. E. John	804 Medical Arts Bldg., Roanoke
Washington			F. J. Dingler	1502 Medical & Dental Bldg., Seattle 1
West Virginia			C. J. Gavelda	Clarksburg
Wisconsin			K. F. Crane	1233 Bankers Bldg., Milwaukee 2
Wyoming	June 19–21	Casper	J. D. McNiff	208 Grand Ave., Laramie

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 23–27	Birmingham	M. W. Gaillard	Merchants Bank Bldg., Mobile
Arizona	June 25–28	Phoenix	R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 23	Little Rock	H. E. Hanna	National Bank of Commerce Bldg., El Dorado
California	June 16 July 14	Los Angeles San Francisco	K. I. Nesbitt	515 Van Ness Ave., San Francisco 2
Colorado	June 15–19	Denver	E. G. Netherton	724 Republic Bldg., Denver 2
Connecticut	June 24–28	Hartford	C. G. Brooks	New London
Delaware	June 25–27	Wilmington	P. K. Musselman	Newark
D. of Columbia	June 9	Washington	H. A. Swanson	1726 Eye St., N.W., Washington
Florida	June 30–July 3	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Illinois	June 24–27	Chicago	W. A. McKee	503 Wood Bldg., Benton
Indiana	June 16–19	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Kansas	June 2–5	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Maine	June 8–10	Augusta	R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 9–11	Baltimore	K. W. Preis	700 Cathedral St., Baltimore 1
Massachusetts	July 7–9	Boston	J. C. Wilson	413 N. State House, Boston
Michigan	June 16	Detroit	J. L. Champagne	502 David Whitney Bldg., Detroit 26
Minnesota	June 16–21	Minneapolis	E. E. Comartin	334-100 First Avenue Bldg., Rochester
Mississippi	June 17–19	Jackson	W. R. Madden	Forest
Missouri	June 2–7 June 4–7	Kansas City St. Louis	R. R. Rhoades	Central Trust Bldg., Jefferson City
Nebraska	June 9–12	Omaha	C. A. Bumstead	924 Stuart Bldg., Lincoln
New Jersey	June 9–13		W. A. Wilson	150 E. State St., Trenton 8
North Carolina	June 23	Raleigh	F. O. Alford	Charlotte
North Dakota	July 6–11	Fargo	W. J. Ford	Fargo
Ohio	June 16–21*	Cleveland	F. D. Lowry	79 E. State St., Columbus
Oregon	July 7–10	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 23–28†	Philadelphia and Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
South Carolina	July 7	Columbia	E. G. Bumgardner	1517 Hampton St., Columbus 29
South Dakota	June 22–26	Sioux Falls	T. E. Burrington	Box 5, Rapid City
Tennessee	June 9–13	Memphis	J. J. Vaughn	1001 Medical Arts Bldg., Nashville
Utah	June 5–7	Ogden	S. W. Gallinger	1001 Tribune Telegram Bldg., Salt Lake City
Vermont	June 23–25	Montpelier	C. I. Taggart	139 Bank St., Burlington
Virginia	June 18–21	Richmond	J. M. Hughes	715 Medical Arts Bldg., Richmond
West Virginia	June 23–26	West Liberty	R. H. Davis	510 Goff Bldg., Clarksburg
Wisconsin	June 9–13	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 23	Casper	O. R. Docekal	Sheridan

*Practical, June 16-18 (dental); June 17 (hygienists).
Theory, June 19-21.
†Written, June 23-25 (dental); June 24-25 (hygienists).
Clinical, June 26-28 (dental); June 26 (hygienists).

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
American Academy of Dental Medicine, First Annual Meeting	June 15	New York	S. Sorrin Program Chm.	745 Fifth Ave., New York 33
American Academy of Periodontology, Twenty-Ninth Annual Meeting	July 31–Aug. 2	Boston	C. E. Chamberlain Secy.	633 Jefferson Bldg., Peoria, Ill.
American Association of Dental Schools	June 23–25	Chicago	J. E. Buhler Secy.	School of Dentistry, Temple University, Philadelphia 30
American Board of Oral Surgery	July 29–30*	Boston	L. M. Fitzgerald Secy.	718 Roshek Bldg., Dubuque, Iowa
American Dental Assistants Association	Aug. 4–7	Boston	A. M. Ferguson	709 Centre St., Jamaica Plain, Mass.
American Dental Association	Aug. 4–8	Boston	H. Hillenbrand Secy.	222 E. Superior St., Chicago
American Dental Hygienists' Association	Aug. 4–8	Boston	A. R. Fisk Secy.	1704 N. Troy St., Arlington, Va.
American Dental Society of Europe	Aug. 1948	London	K. C. Campbell Secy.	88 Portland Place, London, W. 1.

*Examinations for certification.

Name	Date	City	Secy. or Chm.	Address
American Medical Association, Centennial	June 9–13	Atlantic City, N. J.	G. F. Lull Secy.	535 N. Dearborn St., Chicago 10
American Society of Oral Surgeons, Twenty-Ninth Annual Meeting	July 30–Aug. 2	Boston	H. Bear Secy.	1112 E. Clay St., Richmond 19, Va.
National Dental Association, Thirty-Fourth Annual Meeting	Aug. 11–15	Detroit	J. A. Jackson Secy.	Box 197, Charlottesville, Va.
Canadian Dental Association, National Convention	June 24–27	Digby, Nova Scotia	D. W. Gullett Secy.	211 Huron St., Toronto
British Dental Association, First Annual Peacetime Conference	June 16–21	Bournemouth	W. G. Senior Secy.	13 Hill St., Berkeley Square, London, W. 1, England
Conference on Prosthetic Dental Service	June 13–15	Chicago	C. O. Boucher Secy.	Ohio State University, Columbus 10
International Association of Dental Research	June 21–22	Chicago	E. H. Hatton Secy.	School of Dentistry, Northwestern University, 311 E. Chicago Ave., Chicago
Academy of Denture Prosthetics	July 28–Aug. 3	Boston	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
International Dental Congress, Tenth Annual Meeting	Aug. 4–8	Boston	C. F. L. Nord Secy.	The Hague, Holland
New England Health Institute	June 16–18	Durham, N. H.	Agnes Brennan Secy.	New Hampshire State Health Department, Concord
Western Reserve Dental Alumni Association, Fifty-Fifth Reunion	June 9	Cleveland	H. G. Lamb Secy.	School of Dentistry, Western Reserve University, Cleveland 6
Wisconsin Dental Economic Study Club	Aug. 29–30	Madison	M. M. Tuttle Secy.	20 N. Carroll St., Madison 3

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International Grenfell Association. Staff Selection Committee, 156 Fifth Ave., New York.

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